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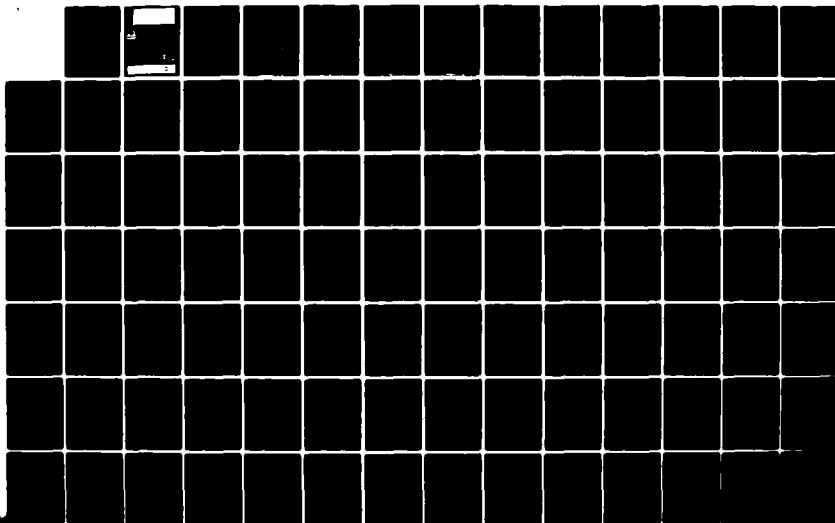
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GREAT RIVER ENVIRONMENTAL ACTION TEAM SEP 80

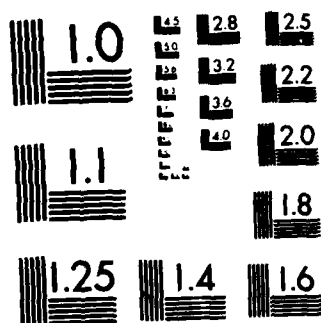
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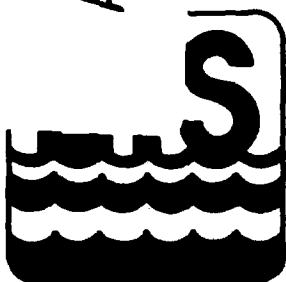
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# GREAT STUDY OF THE UPPER MISSISSIPPI RIVER

TECHNICAL APPENDIXES

VOLUME 9

16



## ENVIRONMENTAL IMPACT STATEMENT

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)  The maintenance of a 9-foot channel for waterborne commerce is essential for a strong Upper Midwest economy; however, to insure that the interests of the total river resources are considered, a channel maintenance plan was developed. Besides selecting disposal sites and formulating recommendations to reduce the overall impact of dredged material operations, other issues addressed are: recreation, wildlife, water quality, sediment and erosion and floodplain management.		



OUTLINE  
GREAT I  
SEPTEMBER 1980

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                 B. DREDGED MATERIAL USES  
                 C. DREDGING REQUIREMENTS

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~~FINAL~~ ENVIRONMENTAL IMPACT STATEMENT

GREAT RIVER ENVIRONMENTAL ACTION TEAM I

STUDY OF THE UPPER MISSISSIPPI RIVER

GUTTENBERG, IOWA TO THE HEAD OF NAVIGATION AT

MINNEAPOLIS, MINNESOTA

FINAL ENVIRONMENTAL IMPACT STATEMENT

GREAT RIVER ENVIRONMENTAL ACTION TEAM I  
STUDY OF THE UPPER MISSISSIPPI RIVER  
GUTTENBERG, IOWA TO THE HEAD OF NAVIGATION  
AT MINNEAPOLIS, MINNESOTA

MEMBER FEDERAL AGENCIES AND STATES:

U.S. Army Engineer District, St. Paul  
U.S. Fish and Wildlife Service, Region 3  
U.S. Coast Guard, 2nd District  
U.S. Environmental Protection Agency, Region V  
U.S. Soil Conservation Service, Minnesota Office  
State of Iowa  
State of Minnesota  
State of Wisconsin

ABSTRACT: The GREAT (Great River Environmental Action Team) I team was formed to develop a river resource management plan for the Upper Mississippi River in response to public and agency concerns over the impact of navigational channel maintenance on river resources. The GREAT I team has developed a channel maintenance plan that, in essence, designates a dredged material disposal site for every historic dredge cut on the river. The team has also developed a set of river resource management recommendations covering navigation channel maintenance, commercial transportation, fish and wildlife resources, sediment and erosion control, recreational resources, and floodplain management. These recommendations include implemental actions, adoption of or changes in management policies, and identification of further study needs.

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## FOREWORD

The final environmental impact statement (EIS) has been prepared primarily by staff of the St. Paul District, Corps of Engineers, for the GREAT I study with assistance from staff members of other GREAT I member agencies and States (see the "List of Preparers" for the primary contributors). The Corps of Engineers will file this final EIS with the Environmental Protection Agency. At that time, a notice of availability will be published in the Federal Register, and an official 30-day comment period will commence. Until such time as the notice is published in the Federal Register, this document should be considered a preliminary final EIS that will become final on the date of notice in the Federal Register. Any changes made in this document prior to the notice date will be forwarded to all recipients.

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\* Because of the hundreds of subheadings, this table of contents is selective rather than comprehensive. Except for section 4.000, "Environmental Effects," which lists key secondary subheadings for the reader's convenience, this table lists only the major headings and primary subheadings.

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Conclusions		Chapter VI	RWG - Conclusions FPMWG - Conclusions and Recommendations FWWG - Chapters III-IV SEWG - Chapter VII CTWG - Conclusions and Recommendations DRWG - Chapters VI, VII, and VIII DMUWG - Chapter X
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\*This is a preliminary index because all of the GREAT I documents were not printed when the EIS went to print. A more detailed index citing page numbers will be prepared and circulated to statement recipients when all the GREAT I documents have been printed.

## Abbreviations:

CM - Channel Maintenance Appendix  
CTWG - Commercial Transportation Work Group Appendix  
DMUWG - Dredge Material Uses Work Group Appendix  
DRWG - Dredging Requirements Work Group Appendix  
FPMWG - Floodplain Management Work Group Appendix  
PPWG - Plan Formulation Work Group Appendix  
PPWG - Public Participation Work Group Appendix  
RWG - Recreation Work Group Appendix  
SEWG - Sediment and Erosion Work Group Appendix  
WQWG - Water Quality Work Group Appendix

## SUMMARY

### BACKGROUND

The Mississippi River is an integral part of the American heritage. It once served as our Nation's western border, and expansion beyond it was a key turning point in our history. In recent years it has been the center of a major controversy involving reconstruction and/or expansion of Lock and Dam 26, at Alton, Illinois.

The Upper Mississippi River is more than just a river--it is a unique resource because it serves both as a major artery in our inland waterway system and as a site of an internationally significant series of fish and wildlife refuges. It also is a heavily used recreational resource, a source of water for human and industrial uses, and a recipient of our wastes. Finally, for those who are served by the river in one or more of these ways, it is a significant element in our cultural heritage.

Problems have arisen because the various State and Federal agencies who have had management authority on the river have not always seen it as a multi-purpose resource. In 1924, Congress established the Upper Mississippi River Wildlife and Fish Refuge. The primary purpose of this action was to set aside lands and waters for waterfowl. In the 1930's, Congress authorized a series of locks and dams (29 in all) to aid in management of the river as part of our inland waterway systems for commercial navigation. As a result of these actions, millions of people come to the river annually for recreational pursuits, although recreation was not directly included in either of the above Congressional actions. The river is also a recipient of many residential, commercial, and industrial wastes. Clearly, agencies could not continue to address the river in piecemeal fashion and expect it to serve all users and uses without the eventual development of conflicts and problems. In the mid-1970's, the various agencies involved began to question whether there was a better way to manage this resource which is known as the Upper Mississippi River.

### GREAT

In 1974, under the leadership of the two principal management agencies on the river, the U.S. Army Corps of Engineers and the U.S. Fish and Wildlife Service, an interagency team was organized to identify and assess the problems associated with multi-purpose use of the river and to develop recommendations for improved management of the river. The Upper Mississippi River was geographically divided into three study reaches, each covered by its own study team called the Great River Environmental Action Team, or GREAT.

The first of these studies to be completed was the GREAT I study. It covered the reach from the Head of Navigation in Minneapolis-St. Paul, Minnesota, to Guttenberg, Iowa. The team was organized in 1974 with add-on funds through the Corps of Engineers operation and maintenance budget and was formally authorized by Congress through Section 117 of the Water Resources Act of 1976. The GREAT I

team was composed of the following representatives: the U.S. Department of the Interior, Fish and Wildlife Service; the U.S. Department of Defense, Army Corps of Engineers; U.S. Department of Agriculture, Soil Conservation Service; the U.S. Department of Transportation, Coast Guard; the U.S. Environmental Protection Agency; the State of Iowa, Iowa Conservation Commission; State of Minnesota, Department of Natural Resources; State of Wisconsin, Department of Natural Resources; Minnesota-Wisconsin Boundary Area Commission, Ex Officio member; Upper Mississippi River Basin Commission, Ex Officio member; and the general public. From 1974 through 1980, this team carried out an extensive program of research and pilot action projects, dealing with many aspects of river resource management.

#### CHANNEL MAINTENANCE

Background - Under authorization of the River and Harbor Act of 1930, the U.S. Army Corps of Engineers operates and maintains a 9-foot navigation project for commercial navigation through the operation of a series of locks and dams and through annual maintenance dredging of the main channel. Average dredging volumes in the last 50 years have been almost 1.5 million cubic yards annually. Corps of Engineers channel maintenance activities, especially dredged material disposal, has been an area of special concern to State and Federal resource management agencies. This concern was one of the moving forces for the initiation of the GREAT study.

Disposal of dredged material in the past has been confined primarily to lands and waters in the river floodplain, resulting in direct and indirect destruction and damage to the river's vital wetland habitat. This damage has reduced the quantity and quality of natural habitat necessary for survival of the numerous fish and wildlife species that depend on the river's ecosystem for life. Furthermore, State floodplain management agencies believe that the cumulative impact of this material placement has affected the flood storage capacity of the river floodplain. At the same time, the placement of dredged material has created and expanded areas of bare sand along the river that are attractive to recreational boaters for picnicking and camping.

GREAT I has acknowledged that maintenance of the 9-foot navigation project is essential for a strong Upper Midwest economy, and thus continuation of this project is in the best interests of the people of this region. However, to insure that the interests of the total resource are considered, and to comply with State and Federal regulations, a channel maintenance program must also consider other resource uses and users.

To provide for an environmentally and economically sound channel maintenance program, GREAT I has developed interim guidelines and a long-term plan (Channel Maintenance Plan) for placement of dredge material at selected interagency acceptable sites both in and out of the floodplain. In addition to recommending a series of actions, GREAT I developed policy and funding changes and study needs to address problems and issues associated with channel maintenance.

Channel Maintenance Plan - The development of a Channel Maintenance Plan involved selecting disposal sites for projected dredging needs on the river and formulation of recommendations to reduce the overall impact of dredged material disposal operations. Selection of disposal sites initially involved identification of seven alternative plans which eventually were narrowed down to a National Economic Development (NED) plan and an Environmental Quality (EQ) plan. Originally, a no action plan was developed called the Most Probable Future Without GREAT plan. However, the requirements of the Clean Water Act of 1977 rendered the Most Probable Future Without GREAT plan essentially obsolete and no new no action plan was formulated. The no action alternative as it stands now would be a continuation of the Corps practice of selecting a disposal site in coordination with the State and Federal agencies on an as-needed basis by dredging job.

The criteria for developing the NED plan were as follows: (1) minimize the need for erosion control in site preparation, (2) minimize the effects on flood flows, (3) meet water quality standards, (4) minimize adverse recreational impacts, (5) minimize dredging costs, (6) maximize beneficial use of dredged material, (7) minimize infringement upon commercial navigation, (8) minimize site acquisition costs, (9) maximize recreation enhancement potential, (10) enhance industrial and commercial development, (11) minimize agricultural impacts, and (12) minimize impacts on commercial fishing and trapping.

The criteria for developing the EQ plan were as follows: (1) minimize the need for erosion control and site preparation, (2) minimize effects on flood flows, (3) meet water quality standards, (4) minimize adverse recreational impacts, (5) maximize fish and wildlife enhancement potential, (6) minimize adverse effects upon fish and wildlife habitat, (7) eliminate adverse impacts on endangered species, (8) eliminate adverse impacts on cultural resources, (9) eliminate impacts on wild and scenic rivers, and (10) eliminate impairment of lands under consideration for wilderness designation.

A selected or recommended plan was developed from the EQ and the NED plans. In some instances a compromise disposal site was selected if neither the NED nor the EQ site was acceptable to the GREAT I team. Final site selection was done on a consensus/caucus vote of the member Federal agencies and States. If a consensus could not be reached, Federal and State caucuses were held. Approval of a disposal site required both Federal and State caucus approval.

Tables 2 and 5 on pages 19 and 154 of this EIS summarize the impacts associated with the NED, EQ, and Selected plans. Tables 4.1-4.14 analyze the site-specific impacts (see pages 92-153).

Channel Maintenance Recommendations - In addition to dredged material disposal, many other problems and issues associated with channel maintenance were identified by GREAT I. During this study, the following surfaced as the major problems and issues related to channel maintenance.

a. The definition of the 9-foot channel is unclear in terms of the depth of dredging allowed to maintain the navigation channel. GREAT I recommends that the depth of the channel be defined as a channel deep enough to provide for safe navigation of 9-foot draft vessels (Policy/Funding Item 8).\*

b. Because emergency dredging is exempt from compliance with State water quality regulations, the definition of emergency dredging is an important issue between the Corps of Engineers and the States. GREAT I has developed an emergency dredging definition (Policy/Funding Item 3).

c. The historical Corps practice of over-depth dredging is an issue because it significantly increases the volume of dredged material disposal and subsequently increases the disposal impacts compared to what would occur if the channel were dredged only to 9 feet. (This question is related to the issue of a. above.) GREAT I recommends a program to reduce dredging depths (Action Item 4).

d. The impacts of open water or riverine disposal are highly controversial, and little is known of the specific impacts of this practice. GREAT I recommends studies of riverine disposal to determine its usefulness and acceptability (Further Study Item 11).

e. State and Federal laws and regulations can limit beneficial activities on the river such as fish and wildlife and recreation enhancement efforts. GREAT I recommends that the States and Federal agencies modify their laws and regulations to accommodate resource enhancement projects (Policy/Funding Item 7).

f. Corps of Engineers policy is such that no land can be purchased for dredged materials disposal. This policy is a problem on the Upper Mississippi River in that existing Federal lands available for disposal along the river are generally wetlands, in the floodplain, and valuable fish and wildlife habitat. GREAT I recommends that the Corps of Engineers change its policy along the Upper Mississippi River to allow the purchase of private land for dredged material disposal (Policy/Funding Item 6).

g. The water quality impacts of dredging and disposal are not clearly understood, and thus are highly controversial. In addition, existing water quality standards were not necessarily developed to deal specifically with dredging and disposal operations. GREAT I recommends that water quality criteria and standards directly applicable to dredging and disposal operations be developed (Action Item 9).

The impact of the seven channel maintenance recommendations discussed above plus the 26 others developed by the GREAT I team should be to reduce the adverse impacts of dredging and disposal operations and to provide avenues for further studies that could develop methods to further reduce these impacts. The recommendations should foster and increase the awareness and consideration of all resource values in the conducting of channel maintenance operations. Finally, there should be reduced controversy concerning channel maintenance operations, allowing management agencies to make more positive steps in management of the river's resources.

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\*A complete list of the GREAT I team recommendations can be found in section 2.000 of this EIS and Chapter VII of the main report.

## SEDIMENT AND EROSION CONTROL

As identified by GREAT I the most pervasive and damaging problem for the Upper Mississippi River is erosion from basin uplands. Approximately one-quarter of the open water areas present when the lock and dam system was completed in 1939 has become marshland. Since 1894, approximately one-third of the capacity of Lake Pepin (Pool 4) has been lost to sediment.

While sedimentation is a natural phenomenon, its effects on the Upper Mississippi River are accelerated by the pooling effects of the locks and dams. GREAT I recommends that soil erosion control practices be accelerated on that portion of the drainage basin where most of the fine sediments originate (approximately 18 percent of the drainage basin) and that funds be provided for the development of new erosion control techniques and methodologies (Action Item 12 and Further Study Item 17).

While sedimentation cannot be completely stopped, the impact of these recommendations, if implemented, should be to prolong ecological life of aquatic environments along the Upper Mississippi River and at the same time provide agricultural benefits through erosion control.

## WATER QUALITY

Water, the basic resource of the river, is the major element of the aquatic environment and the lifeblood of the plant and animal environment. It is essential for human habitation, and it is a highway for commercial vessels. The quality of life for all living organisms (man included) is directly related to the quality of the water in the river.

Upper Mississippi River water quality is affected by a combination of direct discharges of waste water (point source), upland and spring bank erosion (non-point source), and the quality of water from the tributaries. The problem of water quality impacts during dredging and disposal are addressed under the section entitled Channel Maintenance. The major problems of point source and nonpoint source pollution are being addressed in other Federal programs such as the National Pollution Discharge Elimination System, and the Section 208 program. The GREAT I team lends its support to these programs. No other significant issues related to water quality were identified during the study.

## FISH AND WILDLIFE

The value of the Upper Mississippi River to fish and wildlife cannot be overstated. Besides being an internationally significant migration route for waterfowl, the river hosts 270 species of birds, 50 species of mammals, 123 species of fish, and 35 species of reptiles and amphibians. The main channel, islands, and backwaters were recognized for their national significance in 1924 when Congress established the Upper Mississippi Wildlife and Fish Refuge. This refuge encompasses over 195,000 acres of land and water along 284 miles of the river, part of which lies in Pools 4 through 10 of the GREAT I study area.

While the initial construction and operation of the lock and dam system resulted in an increase of wetland acreages, the wetland values are being reduced as a result of sedimentation. If future generations are to enjoy hunting, fishing, and observation of this magnificent resource, immediate action to reduce the trend of sedimentation and to rehabilitate precious habitat already lost needs to be undertaken.

The following were identified during the GREAT I study as the most important issues and problems relating to fish and wildlife:

a. Losses of aquatic habitat due to sedimentation from upland sources. GREAT I has recommended action to curb the source of fine sediments (see Sedimentation and Erosion Control sections). In addition, GREAT I has recommended studies to develop methodologies to protect critical backwaters from sedimentation (Further Study Item 19). GREAT I has also identified critical backwater areas that should receive first priority consideration and study for protection and rehabilitation (Further Study Items 21, 23, 24, and 25).

b. The Corps of Engineers has limited authority to cooperate in protecting and maintaining the river's fish and wildlife resources without State or local cooperation. The Corps of Engineers cannot barge dredged material, open side channels or boat accesses, alter wing dams or blocking dams, construct partial closing dams, construct berms, modify placement sites, obtain additional dredging equipment, or hire private dredging contractors, if the work equipment is to solely or primarily benefit fish, wildlife, or recreation resources without State or local cost-sharing. However, the Corps has the equipment and the expertise to perform these necessary functions for the States and the Fish and Wildlife Service. GREAT I recommends that the Corps be given definitive authority to assist the Fish and Wildlife Service and the States in accomplishing fish and wildlife and recreation projects (Policy/Funding Item 11).

c. Management of the river's fish and wildlife resources has historically been a piecemeal process, with independent and occasionally opposing programs and objectives reducing the effectiveness of management. GREAT I recommends that various steps be taken toward coordinated management of the river's fish and wildlife resources such as development of a Refuge Master Plan, development of unified management objectives, and managing the river as an ecological unit (Policy/Funding Items 9, 10, 14, and 15).

d. Concern has developed that funds expended solely for fish and wildlife and recreation by the Corps not be allocated as costs for maintaining the navigation project especially since user charges for water resource projects may become more common in the future. GREAT I recommends that separate line items for fish and wildlife and recreation be shown in future funding requests and that user/beneficiary cost data be developed (Policy/Funding Items 12 and 13).



The impact of the 12 fish and wildlife recommendations discussed in this section and the 14 others developed by the GREAT I team should be more coordinated and unified management of these resources by Federal and State management agencies. Specific actions and studies are recommended that will lead to general and area-specific protection and enhancement of the fish and wildlife resources of the river. Site-specific actions can lead to the protection and enhancement of over 15,000 acres of wetlands.

#### COMMERCIAL NAVIGATION

Commercial navigation systems in the GREAT I area consist primarily of a 9-foot navigation channel, locks, fleeting areas, and terminals, plus the navigation vessels and barges themselves. This mode of transportation serves as a vital link in our national intermodal system. A 1975 study by the Upper Mississippi River Waterway Association concluded that the river system handles 56 percent of the area's grain exports, 41 percent of the area's fertilizer, and 28 percent of the refined petroleum products. In addition, about one in every three people in the Upper Midwest is served by electricity generated by barge coal.

An assured navigation channel is essential to the continued vitality of this industry. In addition to issues and concerns relative to channel maintenance, the following major issues concerning commercial navigation were identified during the GREAT I study.

a. Commercial navigation interests are concerned that an excessive overlap in Federal, State, and local government agency regulation of water transportation development causes unnecessary delays in accomplishing needed development. GREAT I recommends that a study be made of this problem to identify where there may be unnecessary and overlapping regulation of the industry (Further Study Item 35).

b. There is a general shortage of barge fleeting areas to meet present and future needs. GREAT I recommends a study to identify acceptable fleeting areas (Further Study Item 36).

The impact of the seven commercial navigation recommendations should be to reduce constraints in commercial navigation from regulations, lack of fleeting areas, inadequate bridges, and lockage congestion, and also to identify solutions to future needs of the industry. This could put additional pressure on the natural resources of the river if these resource values are not given adequate consideration in the decision-making processes.

#### RECREATION

Over 3,000,000 people live along the Mississippi River in the GREAT I area, with nearly 2,000,000 in the St. Paul-Minneapolis metropolitan area. By the year 2025, the total will grow to almost 5,000,000 people.

There are already over 8,000 marinas and private slips in the GREAT I area, and use of the river for boating, hunting, fishing, camping, etc., is extensive. Little has been done to provide an over-all management process for this extensive activity. Because recreation management has not been the clear mandate of any of the agencies, little historical monitoring has been done to accurately determine demands and needs. GREAT I provided valuable baseline data by doing extensive surveys of facility inventories. Conclusions from work done to date indicate that the recreational use of the river will grow and that the need for management of this activity will be more important than ever. GREAT I identified many needs relative to recreation with the following as the major issues and problems identified.

a. Historic dredged material disposal sites have been identified as valuable recreation areas. However, with changing practices in dredged material disposal to protect other resource values, these sites are losing their recreational values due to increased revegetation. GREAT I recommends that some of these historic disposal areas be maintained for primitive (picnicking and camping) recreational uses using procedures identified during the GREAT study (Action Item 19).

b. Current lockage regulations give a certain measure of priority to commercial barge traffic that at times results in large numbers of recreational craft waiting to lock through. These craft are forced to anchor, circle, or leave and return later. This results in a safety problem, excessive fuel consumption, and lost time to the recreationist. GREAT I recommends that lockage waiting areas for recreational crafts be established at problem locks and dams (Action Item 20).

c. Recreation management of the river historically has been haphazard and lax because no agency has a clear mandate to manage the entire area for recreation. GREAT I recommends that a comprehensive recreation master plan for the river be prepared and coordinated by the Upper Mississippi River Basin Commission (UMRBC) (Further Study Item 40).

d. Many private leases on public lands along the river have been authorized over a number of years with little comprehensive planning. GREAT I recommends that these leases be reviewed to determine if there is a higher public need for these lands for fish and wildlife habitats and/or recreational access (Further Study Item 43).

The impact of GREAT I's 24 recreation recommendations should be to determine if the ever-increasing recreational demands on the river can be provided for while minimizing impact on the natural resources of the river and minimizing conflicts with other river users. The objective is to provide quality recreation experiences while protecting the resource base for all users on the river.

## FLOODPLAIN MANAGEMENT

The intrusion of man into the natural floodplain of the Mississippi River has necessitated actions to protect human life and property. This has been principally the responsibility of the three States of Iowa, Minnesota, and Wisconsin; the Federal Emergency Management Agency; and through these bodies, the local units of government.

The major issue identified by GREAT I relative to floodplain management is that the lack of uniform interpretation of the floodplain and lack of consistency by the States in regulating floodplain development has caused difficulties in solving this problem within the large context of our river system. Long-term resolution is dependent upon improving our techniques for analyzing impacts of specific actions on flood flows, and coordinating the management activities of the States. GREAT I recommends that the States develop uniform floodplain management standards (Policy/Funding Item 25).

The effect of the four GREAT I team floodplain management recommendations should be to improve management decisions in the regulation of the Upper Mississippi River floodplain.

## ONGOING PLANNING AND COORDINATION

The GREAT I study has shown that Federal agencies, the States, and the public can work together and approach problem-solving in the best interests of total river resource management. While the National Environmental Policy Act and the Fish and Wildlife Coordination Act mandate that agencies develop a working relationship within certain areas, GREAT I has expanded that idea to all areas of river resource management. Under the organizational umbrella of the UMRBC, GREAT was a conceptual idea that has been relatively successful. GREAT has become a national model for cooperation in the area of water resource planning. Two major concerns were identified during the GREAT I study relative to the continuation of planning efforts on the Upper Mississippi River.

a. The GREAT I study was charged by Congress to develop a river resource management plan. However, the GREAT I team soon realized that they did not have the funding or the time to accomplish this task even though such a plan would be highly desirable. GREAT I recommends that the Upper Mississippi River Basin Commission develop and complete a total river resource management plan (Action Item 39).

b. Concern developed during the GREAT I study as to how interagency coordination and communication would continue after the GREAT I study was completed. GREAT I recommends that an ongoing river resource management team be established by management agencies to plan and promote the implementation of GREAT I recommendations (Action Item 36).

The impact of the ongoing planning and coordination recommendations would be to provide a framework for implementing the GREAT I recommendations and for future coordinated management of the river and its resources by all of the managing agencies: Federal, State, and local.

In summary, the GREAT I recommendations do not provide all of the answers to all of the problems on the river. They do provide a framework and guidance for future management efforts on the river, however. Even the most specific of the GREAT I recommendations, the Channel Maintenance Plan, is designed to be flexible to accommodate changes, if future conditions so require.

Many of the GREAT I recommendations are within existing authorities of the member Federal agencies and States. The States and agencies can at their own discretion proceed with implementation of those recommendations. They can also obtain authorities and funding necessary for implementation of the remainder of the recommendations.

The GREAT I report and appendices will be forwarded to higher authorities and possibly to Congress by the Corps of Engineers and the Upper Mississippi River Basin Commission. The Corps of Engineers will also file the GREAT I EIS with the Environmental Protection Agency (EPA). Once the EIS is filed, an official 30-day comment period will follow.

Federal agencies implementing GREAT I recommended actions will be required to comply with the National Environmental Policy Act of 1969 (NEPA) and Council on Environmental Quality regulations for implementing NEPA (40 CFR 1500-1508). Once this EIS has been filed and the comment period has expired, Federal agencies may use it to satisfy NEPA document requirements when implementing GREAT I recommendations.

To satisfy NEPA requirements, the agencies will have essentially three options. First, they may determine that this EIS adequately addresses the impacts of the intended action and prepare no further environmental documents. Second, they may prepare a supplement to this EIS to address specific impacts not covered in this EIS. Finally, they may prepare an environmental document completely independent of this EIS. Because of the broad nature of most of the GREAT I recommendations, the second and third options are the most likely to be used. Section 6.00 of this EIS identifies those recommendations likely to require additional NEPA documents prior to implementation.

State agencies are not required to comply with NEPA but will have to comply with their own State environmental laws and regulations in implementing GREAT I recommendations.

## 1.000 NEED FOR AND OBJECTIVES OF ACTION

### STUDY AUTHORITY

1.001 For many years, public agencies, private organizations, and individuals expressed concern over the maintenance of the 9-foot navigation channel on the Mississippi River. An environmental impact statement (EIS) prepared by the Corps of Engineers in 1974 revealed that current methods of channel maintenance were having significant adverse impacts upon the backwaters, marshes, and sloughs of the river.

1.002 From 1974 through 1976, efforts were undertaken at various levels by the Upper Mississippi River Basin Commission, the Minnesota-Wisconsin Boundary Area Commission, the Corps of Engineers, and the U.S. Fish and Wildlife Service to develop long-range planning for management of the resources of the Upper Mississippi River. The GREAT study was eventually authorized by Congress in Section 117 of the Water Resource Development Act of 1976. The underlying purpose of this legislation was a recognized need for a long-range plan to manage the resources of the Upper Mississippi. Chapter II of the main report gives a more detailed history of the development of the GREAT I study.

### PUBLIC CONCERNS

1.003 A great number and diversity of public concerns and problems were identified during the study. These ranged from study area-wide problems to more site-specific concerns. Although too numerous to repeat here, all these concerns are listed in Chapter IV of the main report. The major areas of concern include:

1. The problem of dredged material disposal and its impacts upon river resources.
2. The effects of erosion and subsequent sedimentation on river resources and dredging requirements.
3. Conflicting demands of users upon the land and water resources of the Upper Mississippi River.

Within these general areas of concern, many specific problems were identified, as well as other problems not related to these major areas of concern. Chapter IV of the main report discusses in detail the problem identification process as well as how and why problems were selected for study.

### PLANNING OBJECTIVES

1.004 Planning objectives for the GREAT study were defined by the Upper Mississippi River Basin Commission in October 1974. These objectives are as follows:

1. Develop ways to significantly reduce the volume of dredged material removed for the navigation project.
2. Open backwater areas that have been deprived of necessary freshwater flow as a result of navigation maintenance activity.

3. Assure necessary capability to maintain the total river resources on the Upper Mississippi River in an environmentally sound manner.
4. Contain or stabilize all floodplain dredged material disposal sites to benefit the river resource.
5. Assure that all navigation project authorizations include fish, wildlife, and recreation resources as project purposes.
6. Develop physical and biological baseline data to identify factors controlling the river system.
7. Identify sites that can be developed to provide for fish and wildlife habitat irretrievably lost to water development projects.
8. Identify and develop ways to use dredged material as a valuable resource for productive uses.
9. Implement programs to provide for present and projected recreation needs on the river system.
10. Strive to comply with Federal and State water quality standards.
11. Strive to comply with Federal and State floodplain management standards.
12. Develop procedures for assuring an appropriate level of public participation.

#### CONTENT AND SCOPE OF THE EIS

1.005 Council on Environmental Quality (CEQ) regulations on the implementation of the National Environmental Policy Act (NEPA) of 1969 (40 CFR 1500-1508) identify a process called "tiering" and define it (40 CFR 1508.28) as ". . . the coverage of general matters in broader environmental impact statements (such as national program or policy statements) with subsequent narrower statements or environmental analysis (such as regional or basinwide program statements or ultimately site-specific statements) incorporating by reference the general discussions and concentrating solely on the issues specific to the statement subsequently prepared."

1.006 The CEQ regulations (40 CFR 1502.20) also state that "Agencies are encouraged to tier their environmental impact statements to eliminate repetitive discussions of the same issues and to focus on the actual issues ripe for decision at each level of environmental review."

1.007 The GREAT I study and the recommendations of GREAT I fall between the programmatic and the site-specific. Even the most site-specific recommendations, the dredged material placement sites, will require further preparation of environmental documents at the time of their use. Thus, this EIS addresses the impacts of the GREAT I proposals based on the level of existing knowledge that the GREAT I team employed to make its decisions.

1.008 This EIS will identify the additional environmental documents that are expected to be necessary for all of the GREAT I recommended actions.

## 2.000 ALTERNATIVES

### CHANNEL MAINTENANCE PLAN

2.001 The Channel Maintenance Plan (CMP) is the primary product of the GREAT I. The CMP is composed of a Dredged Material Placement Plan (DMPP) and a set of supporting recommendations on channel maintenance.

#### Dredged Material Placement Plan (Action Item 1)

2.002 The DMPP was developed in three phases: initial development by task force, review and selection of sites by the Plan Formulation Work Group (PFWP), and final site selection by the GREAT I team. The selection process is described in detail in the PFWG Appendix and the Channel Maintenance Appendix.

2.003 The initial process was to identify seven alternative sites for each dredge cut:

1. Selective Placement (SP) - lowest cost site.
2. Regional Placement (RP) - up to six sites per pool.
3. Centralized Placement (CP) - one site per pool.
4. Beneficial Use (BU) - dredged material available for beneficial use.
5. Habitat Enhancement (HE) - improving fish and wildlife habitat quality.
6. Removal From the Floodplain (RFFP) - disposal of all material outside the floodplain.
7. Most Probable Future Without GREAT (MPFW/OG) - sites the Corps would probably use if GREAT made no recommendations.

2.004 Developed in 1977, the MPFW/OG sites were, in essence, the no action plan of the DMPP. However, the MPFW/OG plan is no longer a valid no action plan because of the changes brought about by the Clean Water Act of 1977. The Clean Water Act of 1977 requires the Corps of Engineers channel maintenance operations to comply with State water quality laws and regulations. Most of the sites in the MPFW/OG plan can no longer be used because of the requirements of State laws and regulations.

2.005 The seven placement alternatives were used to develop the National Economic Development (NED) and the Environmental Quality (EQ) plans. The following criteria were used in the selection of the NED and EQ plans:

#### 1. National Economic Development Plan Criteria

a. Least-cost disposal sites will be used beyond the exceptions noted below as the NED placement sites unless beneficial use (including but not limited to recreational and industrial enhancement) is available at a cost not in excess of the difference in disposal costs (see Dredged Material Uses Appendix for a description of beneficial uses).

b. Material will be restrained from encroaching outside the designated placement area. This procedure is acceptable under the NED plan unless the sediment is considered polluted. Areas designated as having polluted sediments are:

- (1) The Head of Lake Pepin.
- (2) Lower Pool 2 (Lafayette Bridge to Lock and Dam 2).
- (3) The Minnesota River.

Dredged material from these locations will be contained for 7 days.

c. Every effort is included to minimize flood flow impacts of selective placement sites.

d. Every effort is included to consider recreation (recreational boating, sport fishing, and hunting) and industrial enhancement where impact on flood flows would be minimal.

e. Site acquisition cost was minimized.

f. Impacts on agricultural production were minimized.

g. Impacts on commercial fishing and trapping were minimized.

## 2. Environmental Quality Plan Criteria

a. Sites approved by the Fish and Wildlife Work Group received top priority in the selection of EQ sites.

b. No known endangered species habitat should be adversely affected.

c. Acres of wetland affected should be minimized.

d. Impact on fish and wildlife habitat should be minimized.

e. No known cultural resources would be adversely affected.

f. No known wild and scenic river areas would be adversely affected.

g. Sites subject to erosion would be avoided.

h. Sites adversely affecting flood flows would be avoided.

i. Considering fish and wildlife habitat, water quality would be maintained to the maximum extent possible. Areas requiring 100-percent containment (7-day retention) are the Head of Lake Pepin, lower Pool 2 (Lock and Dam 2 to Lafayette Bridge), and the Minnesota River (total containment of material for these areas is considered mandatory, even though some high quality fish and wildlife habitat may be lost).

j. Recreation open space impacts would be minimized.

k. Habitat enhancement would be maximized.

## Selected Plan

2.006 A "Selected Plan" was developed from the NED and EQ plans by a task force of the Plan Formulation Work Group (PFWG). In some instances, a compromise site was selected if use of the NED or EQ sites had no clear advantage. This "Selected Plan" was voted upon by the PFWG and became the recommended plan in the draft GREAT I report.



2.007 The final selection of sites was done by the GREAT I team on a consensus/caucus voting procedure. If a consensus vote could not be reached, the GREAT I team members divided into Federal and State caucuses to develop Federal and State positions on a site. A site had to be approved by both caucuses to be selected.

2.008 The sites addressed in this EIS are those alternatives that were considered in the final site selection processes of the PFWG and the GREAT I team, that is, the NED sites, EQ sites, and compromise sites brought forth in the PFWG and GREAT I decision-making processes. These sites are listed on Table 1 by pool and are described in the Affected Environment section and (in varying degrees) in the Channel Maintenance Plan. Maps of the alternative disposal sites are contained in Appendix 2. Table 2 summarizes the impacts of the alternative channel maintenance plans.

2.009 GREAT I recognizes that the DMPP must be flexible to deal with the natural, social, economic, and political changes that will occur before and during the implementation period (1985-2025) for the DMPP. The DMPP is intended to be improved as knowledge of the river and its resources increases and as new and better alternative methods of disposal and alternative sites come to light.

#### No Action Alternative - Channel Maintenance Plan

2.010 The no action alternative would be no Corps of Engineers implementation of the DMPP or the recommendations that make up the CMP.

2.011 The Corps has no long-range dredged material disposal plan. Disposal sites are selected on an as-needed basis when dredging is necessary. Site selection is made in consultation with the affected State(s) and Federal agencies. In some instances, it is necessary for the Corps to obtain a State permit for use of a site pursuant to Section 404(t) of the Clean Water Act of 1977. If the CMP were not implemented by the Corps, this annual, as-needed site-selection process would be expected to continue. In all likelihood, many of the CMP-recommended sites would eventually be used, especially those that have been used in the past.

2.012 As stated earlier (paragraph 2.004), the MPFW/OG Plan was developed in 1977 to represent the no action alternative. However, its usefulness for that purpose was voided by the requirements of the Clean Water Act of 1977. Since that time, no new plan reflecting current conditions has been developed to represent the no action alternative.

TABLE 1 SITES CONSIDERED IN THE FINAL  
SITE SELECTION PROCESS

UPPER ST. ANTHONY FALLS POOL

DREDGE CUT	NED SITES	EQ SITES	OTHERS	SELECTED SITES
1. Broadway - Plymouth Avenue Bridge	U.01	U.02	U.03	U.02/U.03
2. Lowry Avenue Bridge	U.01	U.02	U.03	U.02/U.03
3. Soo Line Railroad Bridge	U.01	U.02	U.03	U.02/U.03

POOL 1

DREDGE CUT	NED SITES	EQ SITES	OTHERS	SELECTED SITES
1. Upper Approach to Lock and Dam (L/D) 1	1.01	1.01	1.10	1.01
2. Below St. Paul Daymark	1.01	1.01	1.10	1.01
3. Below Lake Street Bridge	1.01	1.01	1.10	1.01
4. Above Lake Street Bridge	1.01	1.01	1.10	1.01
5. Below Franklin Avenue Bridge	1.01	1.01	1.10	1.01
6. Above Franklin Avenue Bridge	1.01	1.01	1.10	1.01
7. Below Lower St. Anthony Falls	1.01	1.01	1.10	1.01

MINNESOTA RIVER POOL

DREDGE CUT	NED SITES	EQ SITES	OTHERS	SELECTED SITES
1. Mouth	M.27	2.18/M.27		2.18
2. Four Mile	M.25	M.27	M.28	M.28
3. Peterson's Bar	M.06	M.30		M.30/.06
4. Cargill	M.03	M.03		M.03
5. Savage Bridge	M.26	M.03		M.03

POOL 2

DREDGE CUT	NED SITES	EQ SITES	OTHERS	SELECTED SITES
1. Upper Approach to L/D 2	2.30	2.30		2.30
2. Boulanger Bend Lower Light	2.35	2.35		2.35
3. Boulanger Bend	2.35	2.35		2.35
4. Pine Bend Foot Light	2.24/2.25	2.10		2.10
5. Grey Cloud Slough	2.05	2.10	2.24/2.25	2.10
6. Below Cudahy	2.05	2.10		2.10
7. St. Paul Barge Terminal	2.14/2.15/2.13/2.02	2.02	2.40	2.14/2.15/2.13/ 2.40/2.02
8. Harriet Island	2.16	2.16	2.16	
9. Smith Avenue Bridge	2.37	2.37	2.37	
10. Lower Approach to L/D 1	2.18	2.18	2.18	

ST. CROIX RIVER POOL

DREDGE CUT	NED SITES	EQ SITES	OTHERS	SELECTED SITES
1. Kinnikinnic Bar	SC.12/SC.13/SC.14/ SC.16/3.34	2.10	SC.15/SC.21/ SC.26	SC.12/SC.13/SC.15/ SC.16/SC.26/3.34
2. Catfish Bar	SC.21	2.10	SC.11/SC.27	SC.21/SC.27
3. Hudson	SC.01/SC.07	SC.07/2.10	SC.03/SC.04/ SC.05/SC.06/ SC.18/SC.22/ SC.24/SC.25/ SC.28	SC.01/SC.22/SC.18/ SC.03/SC.04/SC.05/ SC.06/SC.28/SC.24

DREDGE CUT	NED SITES	EQ SITES	OTHERS	SELECTED SITES
1. Below Diamond Bluff	3.07/3.10/3.43	3.09		3.09/3.43
2. Coulter's Island	3.12	3.09		3.09
3. Morgan's Coulee	3.16/3.14	3.09		3.09
4. Big River	3.21/3.44	3.09	3.27	3.27/3.09/3.34/ 3.46
5. 4-Mile Island/Truedale Slough	3.28/3.40	3.27		3.27/3.09/3.34/ 3.46
6. Pine Coulee	3.30	3.27		3.27/3.09/3.34/3.46
7. Prescott	3.34/3.33	3.46		3.34/3.46
8. Vermillion River	3.46	3.46		3.46
9. Lower Approach to L/D 2	3.42	3.46	3.47/3.48	3.47/3.48/3.42

POOL 4

DREDGE CUT	NED SITES	EQ SITES	OTHERS	SELECTED SITES
1. Beef Slough	4.04	4.04	4.02/4.20/4.69	4.02/4.20
2. Grand Encampment	4.10/4.04	4.04	4.02/4.20/4.69	4.02/4.20
3. Above Teepeesota	4.13	4.04	4.02/4.20/4.69	4.02/4.20
4. Above Crat's Island	4.16	4.20/4.18	4.19/4.24/4.25	4.25/4.24/4.20/ 4.19/4.18
5. Read's Landing	4.29	4.24	4.25	4.24/4.25
6. Wacouta	4.68	4.37	4.69b	4.37/4.38
7. Below Red Wing High Bridge	4.47/4.48/4.49/ 4.51	4.54/4.57		4.49/4.47/4.54/ 4.57
8. Above Red Wing High Bridge	4.54/4.55/4.56	4.54/4.57		4.57
9. Cannon River	4.52/4.58/4.59	4.54/4.57		4.57
10. Trenton	4.60/4.63	4.57		4.63
11. Above Trenton	4.67	4.57		4.57

POOL 5

DREDGE CUT	NED SITES	EQ SITES	OTHERS	SELECTED SITES
1. Mt. Vernon Light	5.03	5.30/5.03		5.30
2. Somerfield Island	5.06	5.30		5.30
3. Lower Zumbro	5.07	5.30		5.30
4. Fisher Island	5.12	5.30		5.30
5. Below West Newton	5.14	5.24	5.26/5.26A/5.28	5.26A/5.24/5.26/ 5.28
6. West Newton	5.18	5.24	5.26/5.26A/5.28	5.26A/5.24/5.26/ 5.28
7. Mule Bend	5.21	5.24	5.26/5.26A/5.28	5.26A/5.24/5.26/ 5.28
8. Lower Approach to L/D 4	5.25	5.24	5.26/5.26A/5.28	5.26A/5.24/5.26/ 5.28

POOL 5A

DREDGE CUT	NED SITES	EQ SITES	OTHERS	SELECTED SITES
1. Upper Approach to L/D 5A	5A.04	5A.35	5A.25/5A.32	5A.32/5A.25
2. Wild's Bend	5A.08	5A.35	5A.25/5A.32	5A.32/5A.25
3. Head of Betsy Slough	5A.25	5A.25/5A.27/5A.33	5A.32	5A.32
4. Fountain City	5A.34	5A.20/5A.27/5A.33	5A.25	5A.25
5. Island 58	5A.14	5A.27/5A.33/5A.20/ 5A.21	5A.23/5A.36	5A.23/5A.36
6. Lower Approach to L/D 5	5A.23	5A.27/5A.33/5A.20/ 5A.21		5A.23

POOL 6

DREDGE CUT	NED SITES	EQ SITES	OTHERS	SELECTED SITES
1. Homer Point	6.11	6.11	6.17	6.17/6.11
2. Gravel Point	6.14	6.19/6.20	6.17	6.17
3. Below Winona Railroad Bridge	6.17	6.19/6.20		6.17
4. Above Winona Railroad Bridge	6.16	6.19/6.20		6.19/6.20/6.17
5. Island 71 and Boat Harbor	6.27	6.27		6.27
6. Lower Approach to L/D 5A	6.27	6.27		6.27

POOL 7

DREDGE CUT	NED SITES	EQ SITES	OTHERS	SELECTED SITES
1. Upper Approach to L/D 7	7.01	7.01	7.20	7.20/7.01
2. Dresbach	7.13	7.04	7.01/7.05/7.06/ 7.20/8.06	7.20/7.01/7.06/ 7.05/8.06
3. Dakota	7.12	7.04	7.06	7.06
4. Winter's Landing	7.11	7.04	7.06	7.06
5. Queen's Bluff	7.10	7.04	7.06	7.06
6. Richmond Island	7.04	7.04	7.05/7.06	7.05
7. Lower Approach to L/D 6	7.06	7.06		7.06

POOL 8

DREDGE CUT	NED SITES	EQ SITES	OTHERS	SELECTED SITES
1. Warner's Landing	8.31	8.06	8.22/8.30	8.22
2. Crosby Slough	8.01	8.06	8.22/8.30	8.22
3. Below Raft Channel	8.20	8.06	8.30	8.30
4. Head of Raft Channel	8.02	8.30		8.30
5. Brownsville	8.30	8.06		8.30
6. Above Brownsville	8.17	8.06	8.30	8.06
7. Picayune Island	8.06	8.06		8.06
8. Root River	8.06	8.06		8.06
9. Sand Slough	8.15/8.06	8.06		8.06
10. LaCrosse Railroad Bridge	8.28/8.06	8.06		8.28/8.06

POOL 9

DREDGE CUT	NED SITES	EQ SITES	OTHERS	SELECTED SITES
1. Crooked Slough	9.34	9.41	9.47	9.47/9.41
2. Above Atchafalya	9.47	9.47/9.42	9.26	9.47/9.26
3. Lansing Upper Light	9.04	9.03/9.47/8.06	9.26	9.26/9.47/9.03/ 9.28
4. Indian Camp Light	9.18	9.08/8.06	9.07	9.07/8.06
5. DeSoto	9.36	9.08	9.07	9.07/8.06
6. Head of Battle Island	9.33	8.06	9.11	9.11/9.33
7. Below Twin Island	9.20	9.15	8.06/9.11/9.33/ 9.40/9.45	9.15/9.11/9.33/ 8.06
8. Twin Island	9.38	8.06	9.11/9.15/9.33/ 9.40/9.45	9.15/9.11/9.33/ 8.06
9. Island 126	9.21/9.39	9.15/8.06	9.11/9.33/9.40	9.15/9.11/9.33/ 8.06
10. Lower Approach to L/D 8	9.39	8.06	9.11/9.15/9.33/ 9.40	9.15/9.11/9.33/ 8.06

POOL 10

DREDGE CUT	NED SITES	EQ SITES	OTHERS	SELECTED SITES
1. Upper Approach to L/D 10	10.33	10.02	10.03	10.02/10.03
2. McMillian Island	10.18	10.04		10.04
3. Wyalusing	10.01	10.01	10.24	10.01
4. Wyalusing Bend Light	10.20	10.01	10.24	10.01
5. McGregor	10.21	10.01	10.09/10.41	10.41
6. East Channel	10.09	10.09		*
7. Mississippi Gardens	10.30	10.40	10.09	10.40
8. Jackson Island	10.14	10.09	10.15/10.40	10.40
9. Hay Point	10.16/10.23	10.09	10.40	10.16/10.40
10. Lower Approach to L/D 9	10.17	10.09	10.40	10.17/10.40

# SUMMARY OF IMPACTS OF THE ALTERNATIVE CHANNEL MAINTENANCE PLANS

Resource Plan	Fish and Wildlife <sup>a</sup>	Water Quality	Floodplain	Recreation Resources	Cultural Resources	Social Environment
NED	730 acres Type 1-2 <sup>b</sup> wetlands lost. 185 acres Type 3-4-5 wetlands lost. <sup>b,c</sup> 2 sites with endang- ered species impacts.	50 sites whose use would likely violate State water quality standards.	90 sites with potential adverse floodplain impacts.	59 sites with recreational enhancement.	14 sites with high potential for adverse cul- tural resource impacts.	6 sites with ad- verse social im- pacts. 6 sites with bene- ficial social im- pacts.
EQ	185 acres Type 1-2 wetlands lost. 165 acres Type 3-4-5 wetlands lost. <sup>d</sup> 1 site with endang- ered species impact.	9 sites whose use would likely vio- late State water quality standards.	23 sites with potential ad- verse floodplain impacts.	6 sites with recreational enhancement.	7 sites with high potential for adverse cul- tural resource impact.	8 sites with ad- verse social im- pacts. 2 sites with bene- ficial social im- pacts.
No Action	No plan formulated. <sup>e</sup>	No plan formulated.	No plan formu- lated.	No plan formu- lated.	No plan formu- lated.	No plan formulate
Selected	315 acres Type 1-2 wetlands lost. 245 acres Type 3-4-5 wetlands lost. <sup>f</sup>	16 sites whose use would likely vio- late State water quality standards.	42 sites with potential ad- verse floodplain impacts. <sup>g</sup>	41 sites with recreational enhancement.	4 sites with high potential for adverse cul- tural resource impacts.	9 sites with ad- verse social im- pacts. 6 sites with bene- ficial social im- pacts.

<sup>a</sup>Wetland acres rounded to nearest 5 acres.

<sup>b</sup>Wetlands lost at NED plan sites are underestimated because 10 NED sites are existing containment areas that would have to be expanded into wetlands to provide 40 years capacity. Expansion acreage has never been calculated. A conservative estimate would be that an additional 150 acres of wetlands would be required.

<sup>c</sup>NED sites would have considerable erosion impact and impact on main channel border habitat not reflected in this table.

<sup>d</sup>152 acres filled as part of two wildlife habitat improvement projects.

<sup>e</sup>No formulated no action plan exists because the Corps selects sites annually on an as-needed basis.

<sup>f</sup>76 acres would be filled as part of a wildlife habitat improvement project.

<sup>g</sup>Site use is conditional upon removal of material before seasonal high water.

## CHANNEL MAINTENANCE AND RIVER RESOURCE RECOMMENDATIONS

### Formulation of Recommendations

2.013 When the GREAT I study was initiated, many problems covering a multitude of aspects on the river were identified by the public, work groups, and the Upper Mississippi River Basin Commission. Following the problem identification and screening process (see the Plan Formulation Work Group (PFWG) Appendix for more detail), the various GREAT I work groups addressed problems relevant to their area of charge.

2.014 In November 1978, the work groups submitted their recommendations to the PFWG. The PFWG reviewed the recommendations and passed the recommendations through a conflict resolution procedure. The recommendations approved by the PFWG were published in the draft GREAT I report in the fall of 1979.

2.015 In April through August 1980, the GREAT I team reviewed the recommendations of the draft report and reworked them into their present form. Recommendations received approval from the team through a consensus/caucus voting procedure. If a recommendation did not receive approval through a consensus of team members, the Federal and State representatives separated into respective caucuses to vote. Majority vote was sufficient in the caucuses to receive approval. If the Federal and State caucuses did not agree upon approval of a recommendation, it was not approved.

### Alternatives, Including No Action

2.015 In the various stages necessary to receive final team approval, some recommendations were revised, some combined, and some subjected to various other manipulations. During this process, various alternatives were proposed. Some alternatives became recommendations, others were combined with recommendations, while others were not adopted in any form. No documentation of formal alternatives was done at any of the levels of decision-making. Therefore, the only alternative available for comparison at this point is the no action alternative. The no action alternative for each recommendation would be non-implementation of that recommendation.

### INTERIM GUIDELINES

2.017 GREAT I has recommended the following Action Item to serve as interim guidelines until the CMP can be fully implemented.

#### Action Item 2

Until the Corps of Engineers can gear up for full implementation of the recommended material placement plan (anticipated 1986), interim guidelines for dredged material placement have been developed. The interim guidelines recommended are basically the procedures GREAT I used in recommending placement sites to the Corps of Engineers during the study.

### Purpose

The interim plan is to guide the Corps of Engineers in dredging and dredged material placement through 1985. After 1985, full compliance with the GREAT I Channel Maintenance Plan (CMP) will be possible. What is provided is a recommended procedure for the Corps and affected States and agencies to follow when dealing with dredging and dredged material placement.

### Procedure

1. The primary guide for the interim is the long-range CMP approved by GREAT I. The placement sites and methods detailed in the CMP should be used in the interim whenever possible. Where the Corps does not have control over approved CMP sites, a systematic acquisition program should be immediately initiated. The CMP has been thoroughly evaluated and debated by GREAT and warrants highest priority.
2. When the CMP cannot be followed, the On-Site Inspection Team (OSIT) should determine the best material placement method and site. The OSIT and its procedures are described in detail in another section of this report. This interagency team should have the experience and perspective to make wise and viable recommendations regarding dredged material placement.
  - a. Beneficial use sites have the highest priority when the CMP placement sites cannot be used. Short-term beneficial uses for dredged material may arise in the interim. If such uses do materialize, dredged material should be provided whenever possible.
  - b. The second priority for placement site selection when the recommended CMP sites cannot be used is placement of material on existing sites. In such cases, the OSIT will specify what measures should be taken to substantially limit erosion or secondary movement from such sites.
  - c. Temporary material placement sites and existing containment sites can be used in the interim if the CMP site is not attainable. However, as specified in the CMP, these sites should be emptied periodically to assure the integrity of the dikes and the capacity to handle emergency dredging volumes. If the OSIT concludes that a particular containment site cannot be used without a high risk of further wetland loss, an

alternative site should be chosen.

3. When the Corps' equipment is not adequate or available for a given project, privately-owned equipment should be sought and the recommended CMP site or the OSIT's highest priority site should be used. All potential contractors should be directly contacted in such cases.
4. Reduced-depth dredging should continue to be used and evaluated during the interim period.

#### Summary

In the interim (1980-1985), the GREAT I CMP should be implemented whenever and wherever possible. When equipment or cost limitations make use of the CMP for a given site impossible, the OSIT procedure (as described in this report) should be used to determine the best placement site and method. Private equipment and reduced-depth dredging are to be used in the interim where appropriate.

#### OTHER RECOMMENDATIONS

2.018 The following Channel Maintenance and River Resource Recommendations, as formulated by the GREAT I team, follow. The impacts of specific recommendations are discussed in section 4.



## CHANNEL MAINTENANCE RECOMMENDATIONS

### Action Item 3

The Corps of Engineers should continue restoring and establishing main stem shoreline protection on a yearly basis following the priority list prepared by GREAT I (Dredging Requirements, Sediment and Erosion, and Fish and Wildlife Work Groups) until completion. In place of funding and equipment capability on an as-available basis only to perform these tasks, the specific authority and funding should be provided to the Corps to stabilize a minimum of 5 miles annually.

### Action Item 4

Average annual dredging quantities should be minimized through application of technically supported reduced-depth dredging and maintenance of minimum channel widths suitable for navigation consistent with the following guidelines:

a. Dredging depths in approaches to rigid structures should be determined by technically supported safety criteria.

b. Dredging depths at other locations should be determined based on potential for increase in frequency of dredging, impacts on the transportation industry, and the demand for dredged material in the area.

A literature search and necessary supplemental research should be conducted to document the impact of channel depth on required channel width to maintain navigational safety.

### Action Item 5

The Corps of Engineers should request the necessary appropriations to purchase efficient dredging equipment to best accomplish all the objectives of the GREAT I channel maintenance plan. Until this equipment is available, the Corps should emphasize contract dredging to meet those objectives.

### Action Item 6

In every case where in-floodplain placement of dredged material is proposed, a quantitative analysis of the effects of that placement must be made. This analysis must include a computation of the effect of any encroachment into the floodway by assuming an equal degree of hydraulic encroachment on the other side of the river for a significant hydraulic reach. Variances to State standards requiring an equal degree of encroachment should be considered where the Federal Government owns the land on both sides of the river within the significant hydraulic reach. Until a quantitative analysis is conducted, the following guidelines will be used:

a. Dredged material should be placed out of the floodplain of the Mississippi River and tributary streams.

b. In those cases where in-floodplain placement is proposed, the material should be placed in the flood fringe rather than the floodway or effective flow area.

c. Placement in the floodway or effective flow area may be conducted on a temporary basis and the material removed from the floodway before the seasonal high water in accordance with written agreements between the State or local floodplain regulatory agencies and affected landowners.

#### Action Item 7

Whenever reasonable, material dredged during channel maintenance should be placed at areas accessible for removal for beneficial purposes. Where known demand for dredged material exists, stockpile sites should be established to maximize the economic and social benefits made possible by having sand available for beneficial uses. A process should be developed and approved by an inter-agency management committee to quickly identify and use new placement sites in order to satisfy new demands (either on a one-time or recurring basis) as they occur.

#### Action Item 8

Temporary material placement sites will be used when private or Government dredging capability to reach the GREAT I recommended channel maintenance plan sites is not expected to be available before dredging is required. These sites will also be considered for use in emergency dredging and imminent closure situations as defined by GREAT I. In the selection and use of temporary sites, the following criteria shall apply:

a. Temporary sites approved by GREAT I are listed in the rationale.

b. The annual notice will include a site plan for all temporary sites, showing material placement and removal plans and appearance of the site after its use.

c. Material stockpiled at these sites will be removed by the following spring high water or as soon as possible under time and/or equipment limitations.

d. Material removed will be taken to the channel maintenance plan approved sites.

e. Temporary placement sites are not endorsed by GREAT unless the material is excavated before any additional material is placed. The additional amount placed is not to exceed the volume removed.

#### Action Item 9

Criteria for sediment and water quality as they relate to dredging and material placement should be developed by the Environmental Protection Agency in consultation with the appropriate State and Federal agencies. Using these criteria, the States should develop uniform regulations for the control of dredging and dredged material placement activities. In the interim, the following guidelines should be used to determine proper methods for dredged material placement.

a. An adequate bottom sediment data base at frequently dredged locations should be developed and maintained.

b. It should be determined if the material to be dredged is contaminated using 40 CFR 230, Interim Guidance for Section 404(b) of Public Law 92-500, Implementation Manual for Section 103 of Public Law 92-532, EPA's "Working Guidelines for Sediment Classification" (Great Lakes Criteria), and any other appropriate information in coordination with the affected States and agencies.

c. Contaminated dredged material shall be placed in an environmentally safe containment area.

d. Uncontaminated material shall be placed in accordance with the GREAT I channel maintenance plan. If the channel maintenance plan site cannot be used, an alternative site shall be selected in coordination with the affected States and agencies including using the On-Site Inspection Team process. Open-water placement or beach nourishment may be considered as an alternative.

e. Water quality during dredging and placement activities should be monitored whenever dredged material or supernatant is returned to the water. Treated effluents shall be monitored for total suspended solids, turbidity, and other appropriate parameters of concern. Open-water placement shall be monitored emphasizing the use of indicator parameters, water quality standard parameters, and toxic substance scans. Water quality and sediment monitoring programs should be coordinated among affected States and agencies.

f. Where contaminated material cannot be adequately contained, appropriate warnings to recreationists shall be posted for a distance of 2 miles downstream of the placement site. When contaminated materials are dredged, designated recreation areas within 1,000 feet downstream of the dredging operation should be posted.

#### Action Item 10

The Corps of Engineers should prepare and implement, after appropriate interagency evaluation, site development plans for all historic and proposed dredged material placement sites. The following guidelines should be used for preparation of the plans:

1. Use landscape architecture skills.
2. Prepare plans before on-site inspection team meetings.
3. Identify proposed uses and management.

4. Consider equipment availability and mobilization.
5. Consider needs for revegetation.
6. Consider needs for erosion control.

#### Action Item 11

Bank stabilization and establishment of sediment traps above the Burlington Northern bridge have been identified as viable alternatives for sediment control on the Chippewa River and should be further evaluated and implemented as soon as possible.

#### Policy/Funding Item 1

Congress should continue to authorize the maintenance of the navigation channel to meet current and future needs of commercial navigation consistent with other resource requirements.

#### Policy/Funding Item 2

The necessary funding and personnel should be provided to the Corps of Engineers for preparation of long-term plans to implement the GREAT I channel maintenance plan. These long-term plans should include scheduling of necessary interagency coordination, permit applications, and land acquisition. Additional specific coordinating activities should be initiated when it becomes apparent that dredging will be required during the dredging season.

#### Policy/Funding Item 3

Emergency dredging should be defined as dredging required to free a grounded vessel or remove shoals in the channel as a result of a vessel freeing itself. The emergency will continue only until an adequate channel depth and width, as determined by the Corps of Engineers, is restored to allow vessel passage.

Imminent closure should be defined as:

- a. The actual water depth is projected by the District Engineer to be 10 feet or less within 14 days or less.
- b. The channel width is less than 85 percent of the normally maintained width.

#### Policy/Funding Item 4

The Corps of Engineers should maintain sufficient dredging capability in the St. Paul District to perform emergency and national defense dredging.

Policy/Funding Item 5

The Corps of Engineers should attempt to sell dredged material to sand and gravel companies.

Policy/Funding Item 6

The Corps of Engineers should change its policy and allow acquisition of private lands for stockpiling of dredged material to implement the channel maintenance plan and make material available for beneficial use.

Policy/Funding Item 7

State and Federal agencies should modify their laws and requirements to allow creation and maintenance of interagency recommended recreation and fish and wildlife enhancement within the floodplain and implementation of the channel maintenance plan.

Policy/Funding Item 8

Congress should define the Mississippi River 9-foot navigation project as that necessary to afford safe navigation for vessels with a draft of no greater than 9 feet.

Further Study Item 1

A demonstration dredging project should be conducted during 1980 or 1981 by the St. Paul and Rock Island Districts of the Corps of Engineers to determine the feasibility and cost effectiveness of accomplishing channel maintenance by:

1. Mechanical dredging with a backhoe directly loading onto barges.
2. Hydraulic dredging with direct loading onto barges.
3. Mechanical unloading at material placement sites.
4. Hydraulic unloading at material placement sites.

Further Study Item 2

A plan should be developed to use the river's sediment transport capability to cause necessary dredging requirements to occur near long-term placement sites as environmentally and economically feasible.

Further Study Item 3

The Corps of Engineers should continue to develop computerized sediment transport models of the Mississippi River 9-foot navigation system. As models become operational, they should be used to determine optimum depth for dredging at each dredge cut, possible changes in the wing dam system, and other means for reducing dredging requirements.

#### Further Study Item 4

The Corps of Engineers should initiate dredging at dredge sites below the confluence of major bed load supplying tributaries when the technical relationships indicate a high risk of potential channel closure. The Corps of Engineers should monitor the deltas at the confluence of such tributaries to determine the technical relationships of delta conditions, hydrologic occurrences, and risk to downstream channel conditions. The relationships should be applied to determine dredging activities. When a high risk of potential channel closure is determined to exist, dredging should be accomplished with full consideration of the environmental impacts of the dredging and material placement.

#### Further Study Item 5

The condition of all wing dams and closing dams at all historic dredging sites in the St. Paul District should be identified to determine the need for repair and/or modification.

#### Further Study Item 6

To reduce dredging requirements, operation of main stem dams or construction of low-head tributary dams to create a more favorable Mississippi River stage in relation to tributary stages should be investigated.

#### Further Study Item 7

The Corps of Engineers should investigate the possibility of sand and gravel companies accomplishing the dredging required for channel maintenance.

#### Further Study Item 8

The Corps of Engineers should continue monitoring dredging and material placement activities to further determine impacts on water quality. Parameters tested, as agreed to by an interagency coordinating committee, should be used in correlation with the existing knowledge base and with site-specific sediment and hydraulic characteristics to develop a predictive capability of water quality impacts related to dredging and material placement. When such predictive capability is established, water quality criteria and standards should be reviewed and revised.

#### Further Study Item 9

A follow-up to the Corps of Engineers "Streambank Erosion Site Inventory" should be conducted cooperatively between the Soil Conservation Service and the Corps of Engineers to determine and classify streambank erosion sites not previously identified. Alternatives for bank erosion control should be developed and analyzed for economic and environmental impacts. Implementation authority and cost-sharing criteria should be developed so that control alternatives can be implemented.

#### Further Study Item 10

Bedload sediment entrapment structures (rock gabions, lowhead dams, etc.) should be constructed on lower reaches of intermittent or seasonally dry tributaries on the Wisconsin side of Pool 3.

#### Further Study Item 11

Riverine disposal should be investigated where beneficial uses are unavailable and secondary environmental impacts of riverine placement are less than impacts at alternate placement sites. The investigations should be carried out at no more than two sites and should be subject to the approval of the affected States. Environmental impact conclusions should be considered site-specific unless proven otherwise.

#### Further Study Item 12

The feasibility of removing material from existing placement sites in the floodway, where there is potential for flood flow impacts, should be investigated.

#### Further Study Item 13

When the need for transporting dredged material to an area of high demand has been identified at a specific site, a feasibility study should be made to determine the best means of providing the desired material. Sources to be considered for the material should include historic placement sites as well as proposed dredging operations. All potential methods of moving the material should be considered including rail, truck, pipeline, and barge. Such studies will involve an environmental assessment of impacts.

#### Further Study Item 14

Private enterprise should be encouraged to explore the economic feasibility of transporting sand from dredged material islands to the area of demand.

#### Further Study Item 15

The feasibility of using riprap made with dredged material and cement should be investigated.

#### Further Study Item 16

The potential beneficial uses of fine organic sediments should be studied. The study should address the problems of contaminants and dewatering, often associated with fine organic material, and the possible effects dredging may have on biological productivity at the dredging site.

## SEDIMENT AND EROSION CONTROL RECOMMENDATIONS

### Action Item 12

Application of soil erosion control practices and/or best management practices for nonpoint sources should be increased in the critical sediment source area of the Mississippi River to the extent possible, through the use of programs administered by the U.S. Department of Agriculture (Soil Conservation Service and Agricultural Stabilization and Conservation Service) and similar State programs. Congress and the State legislatures should continue support of ongoing programs. The Rural Clean Water Program should be extended and funded to the level previously authorized (\$400,000,000 per year).

### Further Study Item 17

A concurrent two-part program should be conducted in the GREAT I critical sediment source area to determine the feasibility of large-scale use of conservation tillage farming systems to reduce the sediment yield to the Mississippi River.

### Further Study Item 13

Monitoring of sediment inflow from major tributaries should be continued and additional stations established. The Corps of Engineers should review all tributaries with a coordinating committee to establish priorities for additional sediment sampling stations.

## WATER QUALITY RECOMMENDATIONS

### Action Item 13

The Environmental Protection Agency should maintain a list of all substances that would significantly threaten the riverine environment if a spill occurred. The U.S. Coast Guard should continue to develop and enforce regulations on the shipment of hazardous materials including prohibitions, where necessary.

### Action Item 14

Sanitary pump-outs and trash pickup points should be established in suitable areas.

## FISH AND WILDLIFE RESOURCE RECOMMENDATIONS

### Action Item 15

Each State and Federal agency contributing to the natural resource management of the Upper Mississippi River should place more emphasis on the river by increasing staff and budget allocations to the work on the fish and wildlife resources on the river.



Action Item 16

Gated culverts should be placed at the dike of lock and dam 4.

Action Item 17

A gated culvert should be constructed through the dike of lock and dam 10 to provide a water supply to the waterfowl in pool 11.

Action Item 18

The U.S. Fish and Wildlife Service should continue to upgrade and expand facilities of the Upper Mississippi River Wildlife and Fish Refuge under the Bicentennial Land Heritage Program and other potential funding sources.

Policy/Funding Item 9

The Fish and Wildlife Service in coordination with the States and the Corps of Engineers should develop and implement a comprehensive plan for the management of the Upper Mississippi River Wildlife and Fish Refuge that considers all the fish and wildlife resources of the area and consists of the necessary strategic and operational components to make explicit the background, authorities, and justification for the refuge and objectives, policies, coordination measures, and procedures by which it will be operated.

Policy/Funding Item 10

State and Federal natural resource agencies should cooperatively develop and implement their management programs so that the Upper Mississippi River is managed as an ecological unit.

Policy/Funding Item 11

Congress should provide the Corps of Engineers with definitive authority and additional funding to assist the Fish and Wildlife Service and States in accomplishing fish and wildlife conservation and recreation projects on the Upper Mississippi River.

Policy/Funding Item 12

Future Mississippi River management budgets should show, as separate line items, programs that request funds to benefit recreation or fish and wildlife and are not required to maintain the 9-foot navigation project.

Policy/Funding Item 13

Beneficiary/user data should be developed and used by appropriate agencies in managing water resources and developing cost allocation programs.

Policy/Funding Item 14

Unified management objectives (recreation, fish and wildlife, commercial, etc.) should be developed for each pool or segment of pools. The development of unified management objectives must be consistent with legislative mandates for management of National Wildlife Refuges.

Policy/Funding Item 15

Organisms not native to the Upper Mississippi River corridor should be cooperatively analyzed to determine compatibility with the integrity of the native communities before they are introduced.

Further Study Item 19

The feasibility of protecting critical backwater areas from sedimentation should be studied.

Further Study Item 20

A program to evaluate dredging and island creation in backwater areas for restoration purposes should be developed.

Further Study Item 21

The Weaver Bottoms rehabilitation proposal (Nielson et al., 1978) should be implemented when it can be documented that the impacts, including those on flood stages, water quality, biological productivity, and sedimentation, are acceptable to the affected States and Federal agencies.

Further Study Item 22

The potential of using the Finger Lakes at the dike of lock and dam 4 as a "physical model" for backwater management techniques which have been and may be proposed for the future should be investigated.

Further Study Item 23

The best means for reducing fine sediment flow into Big Slough (river mile 670.5, Iowa) while keeping the slough open to fishing boats should be determined and implemented.

Further Study Item 24

The impact of altering the cuts between the islands separating Lake Onalaska from the main channel of the Mississippi River should be investigated. Structural measures should be built if the results of the investigation determine that the alterations would benefit Lake Onalaska.

Further Study Item 25

Congress should provide funds to the Corps of Engineers to study the feasibility of rehabilitating the Spring Lake area of pool 2.

Further Study Item 26

The monitoring program at Kruger Slough and Island 42 should be continued to document effects of opening side channels.

Further Study Item 27

The distribution of submerged aquatic vegetation, invertebrates (including clams), bottom types and depths, and submerged physical features of the river should be mapped.

Further Study Item 28

The means of controlling the pool water levels for the benefit of fish and wildlife and recreation in harmony with the 9-foot channel project should be investigated. If control is found to be feasible, the Corps of Engineers, Fish and Wildlife Service, and the States should pursue an agreement to implement this practice. In the interim, fish and wildlife should be considered in pool fluctuations presently being done for other purposes on the river.

Further Study Item 29

Primitive or natural areas should be identified and follow-up designations made where appropriate.

Further Study Item 30

Forest management should be considered in the Upper Mississippi River System Master Plan.

Further Study Item 31

A study should be conducted to determine the most effective technique for management of bottomland hardwoods for wildlife.

Further Study Item 32

The life history of the fisheries of the Upper Mississippi River should be studied.

Further Study Item 33

The Corps of Engineers, Wisconsin Department of Natural Resources, U.S. Fish and Wildlife Service, and Vernon County should develop an agreement for placing culverts and openings side channels to Blackhawk County Park near Victory in pool 9.

## AESTHETICS RECOMMENDATIONS

### Policy Item 16

Scenic easements/acquisitions should receive a higher priority in conjunction with the implementation of the Great River Road and other applicable State and Federal programs.

### Further Study Item 34

Aesthetics of the area should be protected as part of any management plan for the Mississippi River.

## COMMERCIAL NAVIGATION RECOMMENDATIONS

### Policy Item 17

So that operating regulations for fixed and opening bridges can be vigorously enforced by the U.S. Coast Guard, the Act of August 18, 1864, Act of March 3, 1899, Bridge Act of 1906, and the General Bridge Act of 1946 should be amended to provide for civil penalties in certain circumstances and for other purposes as recommended by the U.S. Coast Guard.

### Policy Item 13

Obstructive bridges should be rebuilt to provide adequate horizontal and vertical clearances. The Truman-Hobbs Act should continue to be used in rebuilding bridges on the basis of navigational needs and be amended to include:

- a. Replacement or repair of bridge pier protection systems.
- b. Benefits to land as well as marine interests. Since public money is being spent, the total public benefit should be considered in benefit-cost ratios.

### Further Study Item 35

Congress should direct the Department of Transportation or the Corps of Engineers to review Federal, State, and local regulations pertaining to commercial navigation, terminals, and support facilities with a view toward defining more clearly the areas of jurisdiction and proposing the elimination of conflict areas as appropriate.

### Further Study Item 36

A study to identify acceptable fleeting areas to meet present regional shortages and future regional needs should be conducted.

#### Further Study Item 37

The Coast Guard should study the feasibility of establishing a marked channel for commercial transportation vessels in Lake Pepin.

#### Further Study Item 38

The Corps of Engineers should conduct feasibility studies and make recommendations to Congress which address projected capacity limitations at locks and dams 2 and 3 caused by demand increases for commercial and recreational craft.

#### Further Study Item 39

The U.S. Coast Guard should reassess its capability to operate and maintain the navigational aid system within its currently available resources and seek additional capability if necessary.

### RECREATION RECOMMENDATIONS

#### Action Item 19

Primitive recreational use sites should be maintained on an interim basis until implementation of comprehensive management plans.

#### Action Item 20

"Lockage waiting areas" should be developed where suitable to reduce hazards associated with recreational lockages.

#### Action Item 21

Detailed uniform recreational facility guides in a format which includes information unique to the Mississippi River (boating hazards, special regulations, refuge management, locking procedures, etc.) should be provided.

#### Action Item 22

Uniform and/or upgraded signing of recreation areas should be provided.

#### Action Item 23

Control structures should be marked or modified where appropriate to reduce hazards to recreational navigation.

#### Action Item 24

States should adopt and enforce uniform noise levels for recreation boats and other vehicles.

Action Item 25

A bikeway should be provided in conjunction with Great River Road developments.

Action Item 26

A system of canoe trails should be developed through selected backwater areas as a feature of appropriate recreation planning efforts.

Action Item 27

The Fort Snelling back channel under the Mendota Bridge should be opened to the picnic and swimming areas.

Action Item 28

State and Federal agencies concerned with boating safety should intensify efforts to educate recreational boaters on rules of the road and lighting requirements applicable to commercial and recreational vessels.

Action Item 29

The U.S. Coast Guard Auxiliary, boating clubs, and others concerned with boater education, should intensify their education efforts on safety, navigation, and hazards peculiar to vessel operation on the Upper Mississippi River.

Action Item 30

Rental agencies should be required to better brief their patrons on how to handle their boats, river hazards, rules of the road, courtesy, and lockage procedures.

Action Item 31

Additional water patrol personnel should be assigned to the Mississippi River, especially in heavily used areas and high accident areas. Coordination of enforcement programs should continue.

Action Item 32

The "packing out" of trash should be encouraged through educational pamphlets, programs, and signing.

Policy/Funding Item 19

Boathouse permits should be carefully controlled and enforced to prevent extended residency, sanitary discharge, and aesthetic impacts.

Policy/Funding Item 20

The Corps of Engineers should monitor lockages to ensure the proper application of existing lockage regulations and to identify specific problem areas.

If problems are identified, consideration should be given to providing signage, low power radio transmissions (AM, CB, and/or Marine) near the locks to dispense information, and/or lockage waiting areas. Information on designated times should be widely publicized.

Policy/Funding Item 21

High impact recreational development such as large power boat accesses or marinas should be discouraged in or adjacent to areas identified as exceptionally good for hunting, trapping, and fishing or "closed refuge areas."

Policy/Funding Item 22

River management agencies should increase their efforts to work together cooperatively in undertaking site specific intensive recreation surveys and continuous annual sample data collection for input into a recreation resource monitoring program. Methods developed by the GREAT I and GREAT II Recreation Work Groups should be used in these efforts.

Policy/Funding Item 23

A diversity of recreational opportunities should be provided within the river corridor in developing any management plans.

Policy/Funding Item 24

Publicly owned recreational boat launching accesses should be maintained or relocated.

Further Study Item 40

The Corps of Engineers in coordination with the Fish and Wildlife Service and the States should develop and implement a recreation master plan for the Upper Mississippi River system.

Further Study Item 41

A determination should be based on unified resource management objectives (Phase 1 of Recreation Master Plan Development) of the feasibility and acceptability of recreation sites listed in Exhibit 6 [of the Main Report] to determine which should be further funded for implementation to meet existing recreational demand and need. When determined appropriate, specific recreational developments should be immediately implemented.

Further Study Item 42

Water surface use in pools or portions of pools where conflicts exist should be identified and zoned. No wake zones or restricted use areas should be established in constricted areas and/or where heavy recreations use occurs.

#### Further Study Item 43

Further studies which focus on the economic and social benefits and environmental impacts of private leases on Federal land should be conducted. Such leases should be phased out when a needed public use can be demonstrated.

#### FLOODPLAIN MANAGEMENT RECOMMENDATIONS

##### Action Item 33

Detailed topographic and hydrographic maps of the Upper Mississippi River bottomlands in the GREAT I area (at a scale no smaller than 1:12,000; or 1 inch equals 1,000 feet; on an orthophoto base with a contour interval of 2 feet) should be produced.

##### Action Item 34

Water resource projects on tributaries of the Upper Mississippi River in the GREAT I area should address:

- a. Project-induced potential changes in tributary discharges during floods.
- b. Project-induced potential changes in the bed load sediment transport capability of the tributary stream.

##### Policy/Funding Item 25

Uniform standards for floodplain management should be developed for States and municipalities along the GREAT I portion of the Mississippi River. Changes in enabling legislation may be necessary.

#### Further Study Item 44

Funds should be provided to the Upper Mississippi River Basin Commission to study the feasibility of mathematical models for floodplain management, including the Compound Stream Flow Model, and to develop a model(s) based on the findings and recommendations of the study.

#### CULTURAL RESOURCES RECOMMENDATION

##### Further Study Item 45

A comprehensive cultural resources inventory of known sites in the GREAT I area should be done as input to future management decisions.



## PUBLIC PARTICIPATION RECOMMENDATION

### Action Item 35

The Upper Mississippi River Basin Commission should encourage and coordinate efforts to develop information and education programs for the Upper Mississippi River. Such programs should focus on the multiple uses and values of the resources.

## ONGOING PLANNING/COORDINATION RECOMMENDATIONS

### Action Item 36

The agencies represented in GREAT I, by letter of agreement, continue to coordinate implementation of the channel maintenance plan and all other implementable recommendations through the continuation of an ongoing interagency management coordination team. The U.S. Fish and Wildlife Service and the Corps of Engineers would be the initial cochairs. Chairmanship would then be rotated among participating agencies. Participation in this activity will be staffed and funded by individual agency contributions. Agencies will request additional appropriations within existing programs where necessary to accomplish this effort.

### Action Item 37

As part of the above activity/organization the following coordination mechanisms should be used:

a. The interagency On-Site Inspection Team recommended by GREAT I should be continued to provide consultation in the site-specific implementation of the channel maintenance plan and to aid in resolution of new problems which may develop during the annual dredging seasons. Exhibit 1 [of the Main Report] shows guidelines for continuation of the on-site inspection team.

b. A channel dimensions review committee should be established, consisting of representatives of the Corps of Engineers, U.S. Coast Guard, the navigation industry, and representatives from other concerned State and Federal agencies that have expertise in hydraulics or vessel navigation requirements. The task of the committee will be to review industry needs for channel widths and advise the Corps of Engineers in establishing acceptable channel widths and thus guiding dredging operations at affected sites.

c. The existing independent Upper Mississippi River Conservation Committee is encouraged to participate in the ongoing interagency management coordination team. It is suggested they evaluate their role in this effort and participate in a manner they feel appropriate.

#### Action Item 38

Monitoring of GREAT I implementation from an independent citizen perspective should be continued by the Minnesota-Wisconsin Boundary Area Commission. The States of Minnesota and Wisconsin should fund this effort as a work item of the MWBAC.

#### Action Item 39

The Upper Mississippi River Basin Commission through its Great River Study Committee should develop a total river resource management plan. As resources for this plan, the Upper Mississippi River Basin Commission should use the products of GREAT's I, II, and III and the master plan reports as well as other relevant data.

#### Policy/Funding Item 26

As part of the ongoing monitoring of GREAT I recommendations, the guidelines adopted by the Upper Mississippi River Basin Commission are endorsed and reprinted below:

1. The final team report of each GREAT shall be submitted to the Commission through the Great River Study Committee for a 45-day field and public review. The Commission staff will distribute it appropriately.

2. The chairman of the Commission shall convene at least one public hearing at the conclusion of the review of each GREAT report. The public will be provided a 30-day period following the hearings to submit additional statements to the Chairman.

3. The results of the review - all comments, suggestions for revision, and the transcript of hearings - shall be referred to the Great River Study Committee for consideration and resolution. The Great River Study Committee will prepare a transmittal report including results of the review for Commission approval and subsequent submission to the Water Resources Council.

4. Until and unless the Commission determines to include the GREAT Products as components of the CCJP, the Commission will not require the preparation and filing of an Environmental Impact Statement (EIS). However, EIS's may be required for specific major actions. Such EIS's will be prepared and filed by the appropriate implementing agencies.

5. The GREAT reports shall be submitted through appropriate channels to Washington and to the State governments by the Commission, the Corps of Engineers, the participating Federal agencies, and the States.

6. The Commission, through its Great River Study Committee, shall monitor progress of the States and Federal agencies in implementing the recommendations of this process to the public and the Congress.

The Upper Mississippi River Basin Commission adopted the above guidelines to direct the activities of the Great River Study Committee and the Commission in the coordination of implementation of the reports of GREATS I, II, and III.

Further Study Item 46

The Upper Mississippi River Basin Commission should examine the feasibility of using the Geographic Information System (GIS) as a land and water use management tool.

Further Study Item 47

Land ownership and management responsibilities within the river corridor should be documented.

### 3.000 AFFECTED ENVIRONMENT

#### GENERAL

3.001 The GREAT I study area covers the reach of the Upper Mississippi River from the Head of Navigation in Minneapolis, Minnesota, downstream to Lock and Dam 10 at Guttenberg, Iowa, approximately 244 river miles. Also included in the study area are the lower 24.5 miles of the St. Croix River, the lower 14.7 miles of the Minnesota River, and the lower 1.4 mile of the Black River.

3.002 The Mississippi River flows through the major metropolitan area of Minneapolis-St. Paul, Minnesota, at the upper end of the study area. This section of the river is restricted between steep bluffs and stabilized banks and has few backwater areas. The Minnesota River joins the Mississippi River between the Twin Cities. Because it drains predominantly agricultural lands, the Minnesota River contributes a major load of fine sediments to the Mississippi River.

3.003 Below St. Paul, the Mississippi River widens and develops an extensive system of backwater lakes and sloughs along with the navigation pools behind the locks and dams. The St. Croix River, which has relatively high water quality, joins the Mississippi River at Prescott, Wisconsin, about 20 miles downstream of St. Paul.

3.004 Downstream of the St. Croix River, the Mississippi River continues to widen with extensive backwaters and rich wetland habitat until just south of Red Wing, Minnesota. Here the river forms Lake Pepin, a river lake dammed behind the Chippewa River delta. Below the delta, the Mississippi returns to a single main channel with a wide floodplain of extensive backwaters. The Chippewa River contributes a large volume of coarse sand sediments to the Mississippi River.

3.005 The Mississippi River continues its flow downstream through its wide floodplain bordered by high bluffs to the end of the study area at Guttenberg. The river and its backwaters provide significant habitat for hundreds of species of fish and wildlife. Many of these backwaters are part of the Upper Mississippi Wildlife and Fish Refuge. The relatively wild character of the river's floodplain through this reach is significantly interrupted by only three metropolitan areas - Winona, Minnesota, and La Crosse and Prairie du Chien, Wisconsin.

3.006 The Mississippi River is an important transportation corridor. The 9-foot navigation channel extends to Minneapolis. Two railroad lines (the Burlington Northern and Milwaukee Road) follow the river valley on either side from below the study area up to the mouth of the St. Croix River. Major roads also follow the river for the most part, with U.S. Highway 61 in Minnesota and State Highway 35 in Wisconsin being the two most important.

3.007 In the GREAT 1 study area, the Mississippi River and its tributaries drain an area of almost 80,000 square miles: 45,000 square miles in Minnesota, 32,000 square miles in Wisconsin, and the remainder in South Dakota and Iowa. From the headwaters to Lock and Dam 10, the Mississippi drops almost 60 percent of its total fall.

3.008 Man's impact on the Mississippi and its ecosystems increased as the river grew in importance as a trade route. Modifications for navigation on the Mississippi River began as early as 1822 when the Federal Government authorized removal of snags, shoals, and sandbars; excavation of rock in several rapids; and closing off meandering sloughs and backwaters to confine flows in the main channel and thus to assure more adequate depths for navigation in times of low water. The River and Harbor Act of 1878 authorized a 4½-foot channel on the river; this was increased to a 6-foot channel by the River and Harbor Act of 1907. The additional depths were obtained primarily by construction of rock and brush wing dams which were low structures extending radially from the shore into the river for varying distances to constrict water flows. Construction of Lock and Dam 2, completed in 1930, further provided for the 6-foot channel.

3.009 In 1930 Congress authorized the 9-foot Channel Navigation Project on the Upper Mississippi River between the mouth of the Missouri River and Minneapolis, Minnesota. The authorizing legislation provided for a 9-foot deep navigation channel to be achieved by constructing a system of locks and dams supplemented by dredging. The 9-foot navigation project had a profound effect on the Upper Mississippi. The most apparent effect of the project was the conversion of approximately 125,000 acres of forest, fields, and meadows to marshes and open water and the conversion of 552 miles of a comparatively natural free-flowing river system to standing pools and marshes. This habitat alteration resulted in changes to both distribution and population of flora and fauna species.

3.010 The physical changes vary within each navigation pool. Three distinct zones may generally be observed in each navigation pool. In the upper ends of the pools, conditions are much as they were prior to the project except that water levels are more constant. Islands and watercourses off the main channel are prominent. In mid-pool, water now covers what was once river islands and meadows, forming large areas of marshes and shallow water. In the lower ends of the pools immediately above each dam, a lake-like condition exists. (Chapter 3 of the Main Report provides additional information on the study area. Most of the Work Group Appendices also present descriptive information on the GREAT 1 area.)

#### FISH AND WILDLIFE RESOURCES

##### Effects of Man's Alteration of the River

3.011 Man has significantly altered the habitat and the fish and wildlife resources of the Upper Mississippi over the last 160 years from the earliest navigation modifications to the present lock and dam system. Prior to man's alterations, the Mississippi River was a free-flowing river meandering across its floodplain, changing the face of the area with each new channel cut or each oxbow cut off from the river.

3.012 Very little information is available on the habitat of the Mississippi River and its floodplain prior to man's alterations. The earliest reports indicate that the Mississippi River bottomlands were primarily wooded, with many deep sloughs and hundreds of lakes and ponds scattered throughout the bottomlands. Impoundment of the river after construction of the locks and dams dramatically changed the river bottom habitat.

3.013 Initial impoundment flooded bottomland forests, wet meadows, agricultural lands, sloughs, portions of the main channel, and other habitats along the river. In addition, other lands adjacent to the pools came under public ownership. The initial flooding reduced bottomland forest acreages. However, the new public lands have been managed over the last 40 years to allow vegetative succession. The result is that bottomland forest acreages are now comparable to what they were in pre-impoundment days along the Upper Mississippi River. As a result of the creation of the navigation pools and vegetative succession, open areas such as agricultural land, brushland, and wet meadows have been reduced to less than a third of their pre-impoundment acreages.

3.014 The creation of the navigation pools significantly increased aquatic habitat, especially sloughs, lakes, ponds, and marsh habitats. These habitats increased in area over 65 percent from pre-impoundment conditions. This increase is most evident in the lower and middle reaches of the navigation pools.

#### Species Diversity

3.015 The many diverse aquatic habitats provided by the Mississippi River and its backwaters support a great variety of fish. Approximately 100 species have been recorded in the GREAT I study area; 36 species are abundant or common. The Mississippi River supports a sport and a commercial fishery, with some species such as catfish (Ictalurus spp.) contributing to both. The more popular and sought-after sport fish are the bluegill (Lepomis macrochirus), crappie (Pomoxis spp.), white bass (Morone chrysops), largemouth bass (Micropterus salmoides), walleye (Stizostedion vitreum), sauger (S. canadense), and catfish. The four major commercial species include carp (Cyprinus carpio), buffalo (Ictiobus spp.), catfish, and freshwater drum (Aplodinotus grunniens). The average annual commercial catch exceeds 11 million pounds. Chapter 6 of the Fish and Wildlife Work Group Appendix provides a more detailed discussion of the fishery resources of the Upper Mississippi.

3.016 The Mississippi River supports 48 known species of mussels. These include the Sphaeriidae (fingernail clams), which are usually less than one-half inch in length, and the Unionidae, which are much larger. The fingernail clams are abundant and serve primarily as food for waterfowl and fish. Larger mussels have been used in the past for the pearl button industry and presently in the cultured pearl industry. Their populations have been greatly reduced for a number of man-related reasons. Chapter 6 of the Fish and Wildlife Work Group Appendix contains a more detailed discussion of the mussels of the Mississippi River.

3.017 The diversity of habitat along the Mississippi River also provides for a great diversity and abundance of wildlife. A number of factors contribute to this diversity and abundance. The river valley is part of the Mississippi Flyway, resulting in an abundance of bird species present during migration and on through

the nesting season. Further, the river valley lies in the ecotone between the eastern hardwood forests and the prairies. This results in an overlap of species common to these two biomes. A tabulation of wildlife forms gives an indication of the richness of the wildlife resources. There are 51 species of mammals, of which 36 are common. Nearly 300 species of birds frequent the study area, with 100 species nesting there. There are 43 species of reptiles and amphibians. Chapter 7 of the Fish and Wildlife Work Group Appendix contains a more detailed discussion of these wildlife resources.

#### Habitat Types

3.018 The following is a summary of the habitat types most common to the Upper Mississippi River in the GREAT I study area. More detailed discussions of these habitats can be found in Chapter 1 of the Fish and Wildlife Work Group Appendix. If the habitat can be readily classified under Circular 39, Wetlands of the United States, U.S. Fish and Wildlife Service, the type wetland under which it would generally be classified is noted. The definitions of the wetlands found in the study area can be found in the Fish and Wildlife Work Group Appendix.

#### Aquatic Habitat

3.019 River Lakes and Ponds - These areas, broadly referred to as "backwaters," are often connected with the river at normal river stages. Backwaters characteristically have little or no flow, relatively shallow depths, and a bottom layer of silt and sand. They vary in size from several acres up to thousands of acres.

3.020 A diversity of fish species use the backwaters for all life functions. Predominant commercial species are catfish, carp, and bigmouth buffalo, while typical sport fish are northern pike, largemouth bass, crappies, and bluegill. Deeper water areas with sufficient flows in this habitat type provide wintering areas for many of these species. An increasing problem is advanced eutrophication in many backwater areas resulting in excessive plant growth and low dissolved oxygen levels, thus restricting fish use of these areas.

3.021 River lakes and ponds are also used by migratory water birds including ducks, geese, herons, and a large group of less numerous species. Resident wildlife using these aquatic environments are furbearers such as muskrat, beaver, mink, and otter. The type of use that these areas afford includes the full range of life cycle activities for waterfowl and most other resident species. They further serve as feeding areas for migratory species.

3.022 River lakes and ponds generally are classified as Type 4 and 5 wetlands under Circular 39.

3.023 Side Channels - Side channels are departures from the main channel and main channel border with current during normal river stages. Side channels typically occur in the upper and middle pool zones and range from fast-flowing watercourses to sluggish, winding streams.

3.024 The bottom type usually varies from sand in the upper reaches to silt in the lower, with aquatic vegetation common in the shallower areas having silty bottoms and moderate to slight current.

3.025 Nearly all fish species of commercial value, such as channel catfish, carp, buffalo, and freshwater drum, use this habitat throughout the year. Sport fish such as largemouth bass, smallmouth bass, bluegill, and crappie use side channels for all life functions. These areas provide rearing and wintering for northern pike and white bass.

3.026 The predominant wildlife species using side channels are resident furbearers (muskrat, beaver, mink, and raccoon) who use these areas as travel corridors and as feeding and den sites. Occasionally, a valuable area for wood duck brooding or nesting is found along side channels in bottomland forest.

3.027 Sloughs and Side Streams - Sloughs and side streams are relatively narrow branches or offshoots of other bodies of water, characterized by mud bottoms, abundant aquatic vegetation, and little or no current at normal water stage.

3.028 Bluegills, bullheads, largemouth bass, and carp are the predominant species found in this habitat year-round, although several other species depend on these areas as spawning and rearing grounds. Sloughs are similar in value to side channels for various commercial species such as carp and buffalo.

3.029 Wading birds use sloughs and side streams extensively for feeding. These areas provide valuable brood and nesting sites for migratory waterfowl such as wood ducks and are common den and feeding areas for furbearers.

3.030 Sloughs and side streams would generally be considered Type 3 or 4 wetlands under Circular 39.

3.031 Main Channel - The main channel includes only the portion of the river in which large commercial craft can operate. It is a minimum of 9 feet deep and 300 feet wide. A current nearly always exists, varying in velocity with water stages, and the bottom type is primarily determined by current. The upper section within a pool usually has a sand bottom, changing to silt over sand in the lower section. Most of the main channel is subject to scouring action during periods of rapid water flow and by passage of towboats in the shallower stretches.

3.032 Fish species associated with main channel habitat are those adapted for swift currents; deeper open water; and coarse sand, gravel, or scattered rock bottom. Freshwater drum and channel catfish are common commercial fish which use this habitat for spawning, feeding, and wintering. Predominant game fish using this habitat are walleyes, sauger, smallmouth bass, and white bass. Main channel habitat provides valuable deep-water wintering areas for nearly all species in the river, particularly the commercially valuable species.



3.033 Wildlife use of the main channel is restricted to birds, primarily fish-eaters such as gulls, bald eagles, and ospreys. Generally, wildlife use of the main channel is limited because of the continued disturbance from commercial and recreational navigation and the unstable bottom type that does not generally permit growth of aquatic organisms used by wildlife in other sections of the river.

3.034 Main Channel Border - This zone lies between the 9-foot channel and the main riverbank, islands, or submerged definitions of the old main river channel.

3.035 The bottom is mostly sand along the main channel border in the upper sections of a pool and silt in the lower. Although little or no rooted aquatic vegetation is present, the rock substrate of the wing dams, closing dams, and shoreline protection devices associated with the main channel border are excellent habitat for walleye, sauger, smallmouth bass, and other species of fish.

3.036 The main channel border is a primary habitat for freshwater mussels, a food source for aquatic furbearers. Furbearers generally use this area as they do side channels and sloughs for feeding, and the banks occasionally serve as den sites.

3.037 Shore and wading birds use the shallow waters within the main channel border for feeding. Some waterfowl use can also be noted, mainly by wood ducks and mallards.

3.038 The variety of cover, food, and general habitat values provided in the main channel border permits use by a wide diversity of species on a year-round basis. Conditions determining the degree of use by various species depend on season, river stage, and accessibility to other habitats.

3.039 Tail Waters - Tail waters include the main channel and main channel border in the area immediately below the dams which are affected by turbulence of the passage of water through the gates of the dams and out of the locks. These areas change in size according to water stage. The bottom is mostly sand and gravel. It is similar to natural river rapids except for deep scour holes below dams.

3.040 Available food sources and fast, highly oxygenated water are among the factors that make tail waters valuable fishery habitat. This habitat type has allowed the survival of paddlefish and sturgeon which were displaced by inundation of the natural river. Such habitat also provides spawning, rearing, and wintering areas for walleye, sauger, yellow perch, catfish, freshwater drum, and white bass.

3.041 Compared to the other habitat types, the tail waters probably receive the least amount of use by wildlife. Use is limited to gulls, eagles, and osprey feeding. In the winter when most of the water surface is ice, these areas remain open and are used as feeding areas by the raptors that overwinter in the area.

### Terrestrial Habitat

3.042 Bottomland Hardwood Forest - The bottomland hardwood forest of the Upper Mississippi River system most clearly resembles the pre-impoundment natural river configuration. Presently, the majority of the forests lie in the upper and middle pool zones. This habitat includes areas which are seasonally flooded but generally well-drained during the growing season. Terrestrial vegetation is typically hardwood forest overstory composed of elm, maple, willow, ash, and cottonwood over 30 feet high. Typical understory is composed of nettle, poison ivy, wild grape, woodbine, dogwood, chokecherry, and tree seedlings.

3.043 Bottomland forest areas have some value to fish. When these areas are inundated, they provide spawning habitat for northern pike, channel catfish, yellow perch, carp, and buffalo, plus marginal feeding habitat for largemouth bass, bluegill, and walleye.

3.044 The bottomland forest also provides habitat for tree-nesting ducks (such as wood ducks and mergansers), raccoon, white-tailed deer, cottontail rabbit, fox, tree squirrels, songbirds, upland game birds, salamanders, frogs, snakes, and turtles.

3.045 Bottomland forest is generally classified as Type 1 wetland under Circular 39.

3.046 Meadows and Prairies - Meadows and prairies, typically found on the perimeters of the middle zone of the pools, are low-lying areas dominated by grasses, rushes, and sedges, which are seasonally flooded, and which have water-saturated soils at or are saturated within a few inches of the surface during the growing season. These areas are generally old hay meadows that were formerly farmed.

3.047 Adequate water depths for fish use are usually present in these areas only during high water events and thus limit the utility of these areas as fishery habitat. Predominant fish species which utilize these areas when inundated are those which require fairly dense vegetation and shallow water for spawning.

3.048 Meadows and prairies provide valuable pairing, nesting, and feeding habitat to migratory waterfowl. Raptorial birds feed throughout these areas. Deer, pheasant, wild turkey, squirrel, mice, songbirds, and various other wildlife use this habitat type.

3.049 Meadows and prairies along the Mississippi River are generally classified as Type 1 or 2 wetlands under Circular 39.

3.050 Agricultural Lands - Agricultural lands are generally those areas in private ownership that are not normally saturated with water and that have little standing water, with the exception of spring flooding in low-lying areas. These areas serve as secondary food sources for upland wildlife. Wildlife use is similar to that of meadows and prairies. These areas are generally too high and dry to serve as fishery habitat.

3.051 Urban Habitat - The urban environment has a profound effect on wildlife using the Upper Mississippi River in that urban encroachment tends to eliminate much of the diversity and, therefore, number of wildlife species using that area. Occasionally, adaptations by different wildlife species to the urban environment have occurred. This is the case with the increased incidence of urban mallard and Canada geese flocks in and around the cities and towns along the river.

#### Aquatic - Terrestrial Intertace

3.052 Shorelines - Despite the loss of extensive terrestrial acreage as a result of impoundment, habitat diversity within the river corridor greatly increased as many miles of shoreline were created. At the confluence of land and water, a number of habitat requirements are present for fish and wildlife. Numerous species and numbers of both fish and wildlife are present in this area, because of the ecotone or edge effect created by the presence of such a variety of habitats.

3.053 Sand - This habitat is composed of bare or sparsely vegetated sand. Sandbars or shoals are commonly found along the sides or on the downstream ends of islands and along main or side channels. This habitat type receives primary use from smallmouth buffalo for spawning and feeding habitat for walleye and sauger, although numerous other species may use this habitat in association with other habitat types.

3.054 Turtles use sandy shorelines for nesting and resting. Wading birds occasionally also use these areas for feeding.

3.055 Mud - Areas of bare mud or vegetated mud flats are generally found in off-channel areas and are exposed to seasonal water level fluctuations. Fish use of mud flats is limited by water levels and direction of flooding. Mud flats are used by wading birds and ducks as feeding sites.

#### WATER QUALITY

3.056 The Mississippi River serves many uses. Each of these uses requires river water of an appropriate quality. Aquatic life requires the water quality to be high enough to meet individual life requirements. Recreationists generally demand water of high aesthetic quality. Industrial users have still different requirements.

3.057 A variety of substances determine and/or affect the water quality of the river. Some of the more important include domestic or municipal waste discharges, storm sewer discharges, agricultural runoff, and industrial discharges. Major tributaries such as the Minnesota, Chippewa, and St. Croix Rivers have a marked effect on the water quality of the Mississippi River.

3.058 Because of its large population and physical size, the Twin Cities metropolitan area has a significant effect on water quality in and downstream of the metropolitan area. Approximately 100 dischargers are within this area. In addition, the Minnesota River contributes high loads of suspended solids to the river.

3.059 The water quality of the Mississippi does not improve significantly until the St. Croix River enters at Prescott. The St. Croix is of relatively high quality and dilutes the more polluted Mississippi River leaving Pool 2 and the metropolitan area. Also, settling in Spring Lake and reaeration at Locks and Dam 2 improve water quality as the river leaves the metropolitan area. Water quality conditions generally improve downstream. Some industrial and municipal dischargers cause localized water quality degradation. Another major tributary, the Chippewa River, carries a significant load of coarse sediments into the Mississippi River in Pool 4. The Water Quality Work Group Appendix gives a more detailed discussion of the water quality of the Mississippi, Minnesota, and St. Croix Rivers within the GREAT I study area.

3.060 PCB's (polychlorinated biphenyls) present a serious problem in the Upper Mississippi River. Used extensively in many commercial and industrial products and subsequently released into the environment, PCB's are very persistent and pose a threat to human health. PCB levels above the Food and Drug Administration limit for fish used for human consumption have been found in Mississippi River fish. The Water Quality Work Group Appendix presents a more detailed discussion of the PCB and other hazardous material problems.

3.061 Water quality regulations on the Mississippi, St. Croix, and Minnesota Rivers are administered by the individual States; the Environmental Protection Agency has review authority over these regulations. Each State has its own set of water quality standards generally based on water quality criteria developed by the Environmental Protection Agency. The Water Quality Work Group Appendix contains a detailed discussion of water quality standards. One of the major problems concerning water quality regulation on the Mississippi River is the difference between the regulations of the affected States. Because the States have used different approaches in designating water uses on the river and developing standards to protect these designated uses, the regulations and water quality criteria for the river are inconsistent between Minnesota, Wisconsin, and Iowa.

#### MISSISSIPPI RIVER FLOODPLAIN

3.062 The Mississippi River floodplain contains the channel and adjacent areas that are subject to periodic flooding. For planning and regulatory purposes, the floodplain is defined as the area covered by the 1-percent chance (100-year frequency) flood. In the GREAT I area, the floodplain contains over 255,000 acres along approximately 244 river miles between St. Paul and Guttenberg.

3.063 During the Pleistocene ice age, advances and retreats of ice lobes were largely responsible for the formation of the present floodplain of the Mississippi River and its tributaries. Later, Glacial River Warren enlarged the valleys of the Minnesota and Mississippi Rivers beyond the apparent needs of present-day discharges. The river valleys partially refilled with glacial outwash sediments (sand and gravel) as the glaciers subsided and River Warren dropped.

3.064 Almost 40 percent of the Upper Mississippi River floodplain is covered by open water, in the main channel, backwater sloughs, and lakes. Aquatic and marsh vegetation such as arrowhead, bulrushes, water lilies, and associated plants cover another 57,000 acres (22 percent). Most (26 percent) of the remaining unprotected floodplain is composed of mixed bottomland hardwoods, willows, and cottonwoods. Only about 18,000 acres (7 percent) of the floodplain has been developed, mostly for agriculture.

3.065 The bottomlands usually flood, at least for a while each spring, when the combination of melting snow and heavy precipitation increases runoff. The months of highest flows and flooding are March through July.

3.066 The floodplain primarily serves as the means for floodwaters to move downstream. Floodplains serve as both channels of flow and storage areas for floodwaters. As flood runoff increases in volume and the river overtops its natural banks, the effective flow area of the floodplain conducts floodwaters downstream. The backwater or fringe areas of the floodplain hold floodwaters in storage. The water is gradually released as flooding diminishes. Any blocking of effective flow areas or loss of storage areas may increase flood stages and cause additional damage.

3.067 The science of floodplain management recognizes and attempts to preserve the efficiency of the floodplain for conducting and storing floodwaters. State agencies have initiated floodplain management programs that are aimed at preventing flood destruction through restrictions on floodplain use. State enabling legislation has required local units of government to adopt floodplain zoning ordinances. These ordinances describe permitted and non-permitted floodplain uses and place limits and restrictions on future floodplain development. For more detailed information on the floodplain and existing floodplain regulations, see the Floodplain Management Work Group Appendix.

## RECREATION RESOURCES

### Introduction

3.068 The northern section of the Upper Mississippi River provides numerous recreation opportunities for residents of the region. Even before Congress authorized the 4½-foot channel in 1878, the river provided the opportunity to boat, fish, hunt, etc. However, in the early 19th century, recreational uses were few. Today, millions of recreationists use the river. This increase in recreation has resulted from such variables as larger regional populations, changed standard of living, increased leisure time, and improved navigation and recreation features.

3.069 A significant portion of today's recreational activity results from the improved navigation opportunities for large pleasure craft and improved fish and game habitat resulting from the higher water levels created by the locks and dams. The 9-foot channel project provides water surfaces ideally suited for water-associated recreation activities. In addition to a deeper navigation channel, 13 pools or man-made lakes were created, extending for a distance of about 224 miles and forming many marshes, swamps, open sloughs, backwater sloughs, intermediate small lakes, and large open expanses of varying depths. Within the water areas, the environment is ideal for spawning grounds for fish, nesting and rearing areas for waterfowl, and breeding grounds for aquatic furbearers. Water depths and conditions are suitable for movement of river-going yachts, sailboats, houseboats, speedboats, one-man skiffs, and canoes. Numerous areas are suitable for swimming.

### Resource Demand

3.070 Because of the quality and quantity of river resources, projected recreation demands are substantial. Visitor days are estimated to increase 49.8 percent over the next 50 years. Boating and fishing constitute the greatest portion of the demand (77.5 percent projected for 2025). The largest incremental increase in demand is expected to occur between 1980 and 1990, with an average annual increase of 4 percent projected from 1990 through 2025. Pools 4 and 6 are estimated to receive the greatest pressure for public use, while Pools 3, 8, and 9 will support moderate level demands. For details, see "GREAT II Public Use Projection, Revised February, 1978" in the Recreation Work Group Appendix.

### Some User Characteristics

3.071 The user characteristics in Table 3 are taken from the findings of a study of dredged material disposal site users. This group of users is one of the largest on the river. Approximately 352,000 users used 130 dredged material disposal sites in 1978.

3.072 Almost 88 percent of the users surveyed said they enjoyed using dredged material disposal sites and would like to see more of these islands created. As a general recreation experience, the majority (55 percent) of surveyed users preferred to relax in natural areas where few outdoor skills are required and where there is no supervision or control of any activities. Most visitors stated that sandy beaches

TABLE 3  
USER CHARACTERISTICS

<u>Characteristic</u>	<u>Percent</u>
Residence of Users	
Minnesota	40
Wisconsin	34
Iowa	16
Illinois	9
Other	<u>2</u>
Total	100
Recreation Craft Used	
Runabout	50
Houseboat	27
Cabin Cruiser	12
Fishing Boat	8
Canoe	2
Pontoon Boat	<u>1</u>
Total	100
Most Important Activity	
Boating	40
Camping	12
Swimming	16
Fishing	8
Other	<u>18</u>
Total	100
Occupation Classes	
Professional	24
Business	22
Housewife	11
Student	9
Other	<u>34</u>
Total	100
Trip Costs	
Less than \$30	46
\$30 to \$150	36
More than \$150	<u>18</u>
Total	100
Length of Stay	
Daytime Visit	32
Overnight Stay (1)	<u>68</u>
Total	100
Time of Visits	
Weekdays Only	5
Weekends Only	38
Weekdays and Weekends	<u>57</u>
Total	100
First Time Users	13
Did Not Use Locks During Most Trips	68
Did Not Rent Marina Space	66

(1) Overnight users reported more use on islands than on shore, usually camping on board.

(45 percent), adequate water depth (19 percent), uncrowded conditions (13 percent), and safe swimming (11 percent) were the most important criteria in choosing a place to stay. For more information on river users, see the Recreation Work Group Appendix.

#### Recreation Resource Supply

3.073 Over 12,000 acres of developed and over 15,000 acres of undeveloped recreation lands (not including dredged material islands (beaches)) are in the Upper Mississippi River area. Facilities include boat-launching ramps, marinas, camping areas, picnicking, trails, interpretive areas, and fishing piers. For a detailed breakdown of existing facilities, see the Recreation Work Group Appendix.

3.074 Recreational opportunities/facilities are in good supply. However, many of these facilities are unevenly distributed and some may be of less than acceptable quality. Many existing resources require major renovations or changes in management to make them suitable for increasing use.

#### Recreation Resource Needs

3.075 Recreation resource needs are generally measured by the type and amount of facilities required to provide for the projected or anticipated demand estimated by appropriate managing agencies. The Midwest, like most other regions, is generally experiencing increased demand for recreation resources. The Recreation Work Group has analyzed future recreation needs of the Upper Mississippi River. The Recreation Work Group Appendix summarizes the needs of the study area and presents a pool-by-pool analysis of needs. Much of the projected need can be met by upgrading and/or expanding existing facilities.

#### CULTURAL RESOURCES

3.076 Even before the arrival of European settlers in the floodplain of the Mississippi River, the area was inhabited by people with rich and diverse cultural traditions. Unknown numbers of American Indian groups used the river and its environs for transportation, settlement, food procurement, and ceremonial burials.

3.077 The prehistory of the Upper Mississippi River region begins with the final retreat of glaciers more than 10,000 years ago. The first inhabitants followed a cultural tradition termed "Paleo-Indian." These people were nomadic hunters, exploited big game animals for food, lived in small seasonal encampments, and used stone for tools and weapons. They were succeeded by people of the Eastern Archaic tradition, who used a wider range of smaller animals and plants to form their subsistence base and in some areas made tools, weapons, and ornaments of native copper.

3.078 Not until the appearance of the Woodland tradition, between 1500 and 1000 B.C., did strongly differentiated cultural traditions begin to appear. The beginning of the Woodland Period is characterized by the first appearance of pottery and the first evidence for burial of the dead in earthen mounds. One of the most elaborate of North American Indian cultures, the Hopewellian, was present in this area from 500 B.C. to A.D. 100, during the Middle Woodland Period. The last widespread cultural tradition, the Mississippian, began about A.D. 1000 and lasted until the historic period. The historic period begins with the influx of French and British traders into the region, followed by the arrival of European settlers and the growth of towns and cities.



3.079 Much information about the prehistoric and early historic inhabitants of the Upper Mississippi River floodplain has been lost. Agricultural activity, floodplain construction, the operation and maintenance of the navigation pools, and dredged material disposal have destroyed sites and structures. Although many sites have been recorded and protected, the potential is very high for the presence of unrecorded archaeological and architectural resources. The Corps has surveyed a majority of the historical disposal sites.

3.080 As of May 1979, 43 sites (6 prehistoric and 37 historic) in the Mississippi River floodplain were on the National Register of Historic Places. An additional 18 sites in Minnesota, 15 in Wisconsin, and at least 12 in Iowa are listed either in the site files of the respective State historical societies or in publications dealing with historic and prehistoric resources. Included in these listings are the Hastings Historic Residential District, Effigy Mounds National Monument, Overhead Archaeological Site, Old Frontenac Site, and a number of structures in Prairie du Chien.

3.081 Because large areas of the Mississippi River floodplain have not been systematically surveyed for archaeological sites and standing structures, it is difficult to estimate how many site locations could be affected by proposed dredged material disposal sites or other activities recommended by GREAT I. Intensive surveys of project areas and testing of cultural resources will be necessary to determine potential impacts. Survey, testing, and mitigation of significant cultural resources would fulfill Federal agency obligations established by Executive Order 11593, the Advisory Council on Historic Preservation's "Procedures for the Protection of Historic and Cultural Properties" (36 CFR Part 800), and the Archaeological Conservation Act of 1974 (Public Law 93-291).

3.032 A literature search and records review of the area should be conducted to delineate known and potential cultural resources which may be affected. The St. Paul District, Corps of Engineers, is planning to conduct a literature survey of the GREAT I area (independently of the GREAT I study). Upon completion, the results of this research will be available through the St. Paul District Office.

## SOCIAL PROFILE

### Political Boundaries

3.083 The Upper Mississippi River basin above Guttenberg encompasses most of Minnesota, the western portion of Wisconsin, the northeastern counties of Iowa, and the northeastern tip of South Dakota. The boundaries extend 330 miles from north to south and 360 miles from east to west.

3.084 Many small cities, including 71 urban areas, are directly on the Mississippi River. Some of these municipalities are in the floodplain and experience some seasonal flooding. Prairie du Chien and Winona experience regular flooding.

### Urban-Rural Distinction

3.085 Nineteen counties in the basin border the river. Only four are predominantly urban; the rest are rural, with the land largely used for agriculture. The proportion of land area used for farming was 80 percent in 1974, down from 88 percent in 1969. However, rural distinction is not synonymous with farm. While the area is still used for farming, the gain in population is largely nonfarm, rural settlement. This gain reflects the natural trend for migration from the large cities into smaller towns that provide the security and stability not found in the urban areas. The demand for rural settings requires easily accessible metropolitan areas, which makes the scenic river area particularly desirable, especially in Minnesota and Wisconsin.

### Demographics

3.086 The river counties were settled primarily by Germans and Scandinavians over 100 years ago. The residents are third and fourth generation settlers; and, increasingly, migration into the basin "Americanizes" the ethnic culture that once dominated.

3.087 The basin has 4.1 million inhabitants; 44 percent reside in the Minneapolis-St. Paul Standard Metropolitan Statistical Area (SMSA). In 1970, 2.2 million people lived within 50 miles of the river. The majority (1.8 million) were concentrated in the Minneapolis-St. Paul SMSA. The two largest urban areas outside the SMSA, LaCrosse and Winona, had 1970 populations of 51,153 and 26,438, respectively.

3.088 During the next 40 years, the small cities are expected to increase in population more rapidly than the SMSA. Winona is expected to nearly double in population, Hudson to increase by eightfold, and Hastings to triple. This pattern of development is anticipated to increase in rural counties surrounding the SMSA. Although the median age of river county residents (30.0) is consistent with the general population, farmers are markedly older, with a median age of 50.0 years, nearly a generation older than the average population.

3.089 Racial distribution is 99 percent Caucasian. American Indians (Sioux and Winnebago) live in river communities and on open reservation lands. Approximately 200 Sioux reside on or near the Prairie Island Indian Reservation. The Winnebago tribe, estimated at about 50 members, owns reservation land near Hokah, Minnesota, on the Mississippi River. Most of the members live in Hokah or on nearby farms. Few other minority groups are represented in the basin.

### Utilities

3.090 Electrical power is provided by two hydroelectric power plants, six coal-fired plants, and three nuclear plants, all located on the Mississippi, Minnesota, Chippewa, and St. Croix Rivers. The water supply comes from the basin rivers and groundwater wells. While rural areas rely on septic tanks for waste disposal, large cities in the basin have installed central waste disposal systems. Because heating is necessary for one-third of the year, fossil fuels are essential to the area. Oil, gas, coal, and wood are used for heating.

## Business and Industry

3.091 Agriculture and dairying are dominant industries in the Upper Mississippi River basin. Wisconsin leads the Nation in dairy production, and Minnesota ranks fourth. Grain production in the region contributes corn, soybeans, and oats to the Nation's economy. Surplus crops are shipped by barge, truck, and rail to many ports, but only barge shipping allows easy access to international ports. Grain is also processed locally into flour and other grain products that are distributed nationally. The basin provides forest products such as Christmas trees, lumber, veneer, railroad ties, pulpwood, and paper.

3.092 Between 1969 and 1974, the basin counties lost an average of 571 farms each year. This loss has been 188.6 farms each year. Wisconsin's rural counties follow with an average loss of 161.6 farms. Iowa has an average loss of 150.4. The urban counties of Wisconsin and Minnesota reflect a reduced loss, largely because of their previous non-farming land use. While counties lost a number of farms within their boundaries, the average acreage per farm has moderately increased. From 1969 to 1974 (a period of high inflation and increased land acquisition), the average farm increased by 15.4 acres. Of course, urban counties continue to experience a reduction in the size of farms, reflecting continuing urban development. Consistent with a national trend (Beale, 1978) toward part-time farming, 24 percent of those who farm held other principal occupations in 1974. However, the majority (24,232) of basin farmers are still principally farmers. The nationwide movement to part-time farming reflects the attractiveness of rural lifestyles coupled with urban jobs.

3.093 Manufacturing, construction, and social service occupations contribute jobs for local residents. Beale (1978) presents national trends of increased demand for health and public services which, he says, reflect the changing lifestyles of rural Americans. The increases in these services, as well as increases in building construction, will continue as the basin's population grows.

## Tourism

3.094 The river provides water-oriented outdoor recreation for the tourist industry. Camping, boating, fishing, and hunting are within an easy drive for many of the basin's residents, the river's most frequent users. (Recreation use is presented in the Recreation Work Group Appendix.)

## Commerce and Transportation

3.095 Commercial transportation consists of several "modes" - waterway, rail, highway, air, and pipeline. The Upper Mississippi River commercial waterway is of major interest to GREAT I, although rail and highway modes are also important.

3.096 The Mississippi River has historically been a commercial waterway. In 1930, Congress designated the Upper Mississippi River as a Federal navigation project, although it served commercial navigation long before that. Commercial waterway transportation on the river remains important today, nationally as well as regionally. The Upper Mississippi River waterway is part of a highly integrated transportation system which links the Upper Midwest with the rest of the country and the world. Railroads, highways,

pipelines, and airlines also service the region, each mode of service either competing with and/or complementing the waterway to various degrees in the movement of products into and out of the region.

3.097 The waterway's towboats, barges, fleeting areas, and terminals provide vital services to the economy of the region. Terminals are maintained in the majority of urban areas along the river. Firms that depend heavily on the river's commercial transportation often maintain riverside facilities. In the GREAT I area, the Upper Mississippi River and its navigable tributaries contain approximately 89 commercial docks and terminals that ship and receive a wide variety of products.

3.098 Behind these docks are the farms, factories, storage facilities, and refineries which depend on them. Employment related to these industries forms an important element of the regional work force. The ramifications of commercial river transportation reach deeply into the economy of the entire Upper Mississippi River region.

3.099 The waterway mode of commercial transportation has a unique advantage in that it can handle large volumes of commodities per transport. Bulk commodities are best handled by barge, and this mode is often the only one practical to handle large equipment.

3.100 Although the navigation season is limited by climate, the commercial transportation system on the Upper Mississippi River handles 56 percent of the area's grain exports, 41 percent of the area's fertilizer, and 28 percent of its refined petroleum products. Additionally, one-third of the people in the region receive electrical services derived from barged coal.

3.101 The river is expected to increase in importance for regional and national commercial transportation of many commodities. Water transportation is generally more economical for bulk commodities and is more fuel-efficient. Demand for commercial river transportation based on commodity forecast will show a steady increase. Most of the increase has come from raw agricultural products being marketed in the South for export and coal being shipped north (see the Commercial Transportation Work Group Appendix).

3.102 Commercial traffic is limited, economically, by the supply of commodities and their market demand. The economic advantage of commercial waterway transportation over other modes depends, to some extent, on the reliability of prompt delivery. Unnecessary delays in grain shipment south for export or in delivery of fertilizer for the planting season cost money and damage the economy.

3.103 The St. Paul District, Corps of Engineers, maintains a system of 13 locks and dams as well as the 9-foot navigation channel. The locks and dams are essential complements to the 9-foot navigation channel. The authorized 9-foot channel is the most important factor enabling commercial transportation to exist on the Mississippi River. About 36 sites on the Upper Mississippi River require periodic dredging to allow passage of commercial vessels. Wing dikes and bank stabilization projects aid the dredging effort by increasing velocities and keeping cuts aligned. Dimensions and alignment of the channel affect vessel performance and, therefore, the economics of the venture.

3.104 The dredging procedure or frequency would have to change very little if the commercial transportation on this section of the river increased. Locking

capability and fleeting areas would have to be expanded, but the navigation channel is capable of handling additional traffic in the manner that an underused highway can handle more cars; i.e., physically, there is room for more traffic. Locking and fleeting capacity is growing more slowly than the growth in barge traffic (see the Commercial Transportation Work Group Appendix).

3.105 If the economic system favors commercial waterway transportation more heavily in the future, locking capacity would be the first limiting factor and would have to be increased. Control of commercial transportation on the Upper Mississippi River is shared by about 50 State and Federal agencies plus numerous local governments and commissions. This overlapping authority is often confusing and remains a major concern to industry. For more detailed information on commerce and transportation, see the Commercial Transportation Work Group Appendix.

#### CHANNEL MAINTENANCE OPERATIONS

3.106 The locks and dams were designed and constructed to provide a minimum depth of 9 feet for navigation. Programmed operations of each lock and dam are projected and followed to continuously provide this depth. In spite of all planning efforts, annual maintenance dredging of the navigation channel to remove accumulated sediment is necessary to permit passage of vessels requiring 9-foot draft.

3.107 In order to maintain authorized channel dimensions, material is removed from the navigation channel by either hydraulic or clamshell dredge. A hydraulic dredge momentarily suspends the shoaled materials by means of a cutterhead, draws the material into a centrifugal pump, and pumps the material through a combination of floating pipe and shore pipe to a placement site. A clamshell dredge collects the shoaled material in a clamshell bucket and casts the material into a barge or fump scow. The barge is then transported to a placement site, and the material is unloaded onto shore.

3.108 Based on the historic period 1956 through 1975, an average volume of approximately 1.2 million cubic yards of material is dredged each year at approximately 35 different locations. In recent years, these averages have been reduced significantly because of low-flow seasons, reduced-width and -depth dredging, and increased site monitoring. For the 5-year period 1975 through 1979, the average annual dredging volume has been 600,000 cubic yards at an average of 22 sites. It is anticipated that the trend towards lower dredging volumes will continue, with a continuation of the close monitoring of channel conditions and with reduced depth and width dredging unless abnormally high-flow conditions are experienced.

3.109 The St. Paul District has three primary units stationed on the Mississippi River. The U.S. Dredge WM. A. THOMPSON is a 20-inch hydraulic unit with an attendant booster barge with a maximum reach capability of 4,800 feet of floating pipe and 2,000 feet of shore pipe. The U.S. Derrickbarge HAUSER is a 4-cubic yard clamshell unit with attendant plant which allows barging of the material. The Cranebarge WADE, a 3-cubic yard clamshell unit attendant plant to the HAUSER, normally rehandles the material to an on-land site. Additional attendant plant to the HAUSER includes four tender launches, two bulldozers, and six barges capable of direct unloading plus three barges with bottom dumping capability. The U.S. Dredge DUBUQUE, a 12-inch hydraulic unit, includes reach capability of 1,600 feet of floating pipeline and 800 feet of shore pipeline.

3.110 The normal sequence is to dredge routine maintenance sites from Winona, Minnesota, upstream to Minneapolis, Minnesota, with the Dredge WM. A. THOMPSON during May and June. During June, July, and August, the dredge works downstream into the Rock Island District. The Dredge THOMPSON normally returns to the St. Paul District in October and dredges any sites that may have shoaled during the navigation season. The Derrickbarge HAUSER dredges where rock, low bridge clearance, and remote placement site requirements are encountered during the period of May through October and performs structural maintenance and miscellaneous dredging thereafter. All dredging is normally terminated by mid-November due to inclement weather.

3.111 As specified in the enabling legislation, the following are the minimum widths of the channel at low waters:

- (1) Mississippi River - Guttenberg, Iowa, to Hastings, Minnesota: 300 feet.
- (2) Mississippi River - Hastings, Minnesota to Minneapolis, Minnesota: 200 feet.
- (3) Upper Saint Anthony Falls Pool: 150 feet.
- (4) St. Croix River - Prescott, Wisconsin, to Stillwater, Minnesota: 300 feet.
- (5) Minnesota River - Up to Savage, Minnesota: 100 feet.

3.112 Provision is made for additional widths on bends. Currently, channel widths on bends are maintained to a maximum width of 500 feet. In 1977, a survey of the navigation industry, done in conjunction with the GREAT study, provided preliminary recommendations for channel width at bends. Results of this survey are used as a guideline for maintenance dredging width determination. Individual site adjustments are made based on field experience.

3.113 In the past, dredging has normally been accomplished to 9 feet, plus an additional 4 feet of overdepth, for a total of 13 feet. The purpose of the overdepth dredging is two-fold. First, past experience has shown that the navigation channel has closed within days after reaching a depth of 10 feet. This rapid change in depth is due to subsequent shoaling and/or bottom effect of motor vessels or barges. Therefore, channel dredging overdepth of 2 feet is provided for channel stability. Secondly, an additional 2 feet of overdepth is provided to compensate for subsequent shoaling that could occur prior to response by Government or contract plant to assure the integrity of the channel and to maximize cost effectiveness.

3.114 During the period 1974 through 1979, a program of reduced depth dredging was accomplished in conjunction with the GREAT study. Dredging depths were varied between 11, 12, and 13 feet, based on recommendations provided by qualified hydraulic engineers. Reduction of dredging depth decreases the initial dredging quantity which subsequently reduces the magnitude of environmental effects. However, if the reduction in depth only increases the frequency of dredging without reducing the average annual volumes, reduced dredging depths would not be beneficial.

3.115 Initial short-term results of this program have been very successful, with the exception of several sites. However, experience has been gained through a relatively short period which included several low-flow seasons, and the long-term impact on dredging frequency cannot be determined. This program is expected to continue with all proposed dredging sites undergoing a hydraulic engineering review of the dredging depth.

3.116 The St. Paul District performs general sonar surveys for an entire pool before detailed surveys of shoaled areas are accomplished. Advance notice of potential sites based on the general surveys with a degree of probability of dredging are provided to interested agencies. Every effort is made to provide at least 14 days advance notice with detail surveys, dredge cut layout, and proposed placement site prior to dredging, with the exception of critical and emergency dredgings. In some instances, the coordination lead time prior to initiation of maintenance dredging has been extremely short due to rapid channel condition changes and to the logistics of determining the actual condition prior to effecting the required maintenance.

3.117 On-site inspections of potential disposal sites with representatives of the interested agencies are made prior to dredging to accurately identify highly sensitive environmental areas that would be adversely affected if infringed upon by dredged material. Recommendations made at these inspections are considered in the final determination of the placement site within the capabilities of available dredging equipment and maintenance funding.

#### DISPOSAL SITES

3.118 GREAT I undertook a series of disposal site identification and selection actions that are explained in Section 2 of this document, in the Channel Maintenance Appendix, and in the Plan Formulation Appendix. As explained in Section 2, on pp. 13-15, the final set of alternative disposal sites from which the recommended channel maintenance plan sites were selected comprised the NED sites, EQ sites, compromise sites developed by the Plan Formulation Work Group, and sites identified by the GREAT I team in the final selection process. These sites are described on the following pages. GREAT I has not developed site plans for the use of these sites. In the near future, site plans will be developed for the recommended disposal sites.

#### Upper St. Anthony Falls Pool

3.119 U.01 - This is a 4-acre site in Minneapolis lying 500 feet from the river on the right bank at river mile (RM) 855.7. The site lies on the flood fringe, has been used for disposal in the past, and the material is removed for beneficial use by the City of Minneapolis.

3.120 U.02 - A 3-acre disturbed area in Minneapolis lying adjacent to the river on the right bank at RM 857.1, this site is in the flood fringe. Material placed at this site would be removed for beneficial use by the City of Minneapolis.

3.121 U.03 - This 7-acre site, previously used for disposal, lies on the left bank at RM 854.7 in Minneapolis. It is out of the floodplain, and material placed on this site would be removed for beneficial use by the City of Minneapolis.

#### Pool 1

3.122 1.01 - A 3.5-acre area in Minneapolis lying on the right bank of the river at RM 853.0, this site has been used for disposal in the past. The City of Minneapolis removes the deposited material for beneficial use.

3.123 1.02 - This 4.5-acre site on the left bank of the river at RM 848.3 was used for past disposal and is sparsely vegetated by grasses and shrubs. The site lies within the floodway.

3.124 1.03 - A 6-acre area on the right bank of the river at RM 849.5, this site was used previously for disposal and is sparsely vegetated by grasses and shrubs. The site lies within the floodway.

3.125 1.07 - This 11.5-acre site on the left bank of the river at RM 851.2 was used for disposal in the past, is sparsely vegetated by grasses and shrubs, and lies within the floodway.

3.126 1.10 - This is a 1-acre open water site near the left bank of the river at RM 847.7. The purpose of disposal there would be to create an island for recreational craft use as a lockage waiting area.

#### Minnesota River

3.127 M.03 - This is a 7-acre site lying on the right side of the river at RM 13.7. It is about 6,000 feet from the river, is a Type 1-2 wetland (grasses and sedges), and is bounded by similar habitat. It is accessible by hydraulic dredge from Cuts 4 and 5.

3.128 M.06 - This site covers 24 acres lying 2,500 feet from the river on the right side at RM 11.4. It is a low-lying area disturbed by an adjacent gravel quarry operation. This site is accessible by hydraulic dredge from Cut 3.

3.129 M.25 - This 5-acre site on the left bank of the river at RM 4.8 is vegetated by grasses and brush and is adjacent to areas of bottomland hardwoods. It is directly accessible by hydraulic dredge from Cut 2.

3.130 M.26 - This 3-acre site on the right bank of the river at RM 14.4 is vegetated by grasses and shrubs and bounded by grain terminal developments. It is directly accessible by hydraulic dredge from Cut 5.

3.131 M.27 - A 19-acre area on the right bank of the river at RM 0.7, this site is vegetated by bottomland hardwoods and has been used for some disposal in the past to a small extent. The site lies on a small terrace between the river and the bluffs. It is directly accessible by hydraulic dredge from Cut 1.

3.132 M.28 - This site covers 18 acres on a 100-acre island created by a cutoff channel at RM 4.4. The site has been used for disposal in the past and is vegetated by grasses and herbs. The remainder of the island is bottomland hardwoods. This site is directly accessible by hydraulic dredge from Cut 2.

3.133 M.30 - This site is a 65-acre limestone quarry lying 0.8 mile from the river on the right side at RM 11.0. It is not accessible by hydraulic dredge from the river with existing equipment.

#### Pool 2

3.134 2.02 - This 69-acre disturbed upland meadow site lies 1,000 feet from the river on the right bank at RM 836.5. The site is bounded on two sides by highways and railroads and by similar habitat on the third. The site is within reach by hydraulic dredge from Cut 7. It would be difficult to gain pipeline access to the site because of intervening roads and railroad tracks.

3.135 2.05 - An irregularly-shaped 43-acre area on the left bank of the river at RM 832.7, this site is upland meadow being invaded by woody vegetation with interspersed areas of Type 1-2 wet meadow. Bounded on the west by the river and on other sides by roads, industrial development, and upland meadow, this site is accessible by hydraulic dredge from Cut 6.



- 3.136 2.10 - This 25-acre site on the right bank of the river at RM 832.7 lies 500 feet from the river. It is an old manure disposal site for the South St. Paul stockyards bounded by roads and vegetated by herbaceous plants and some invading woody species. This site is accessibly by hydraulic dredge from Cut 6.
- 3.137 2.13 - This is an 18-acre site adjacent to a barge terminal on the right bank of the river at RM 836.0. Parially forested Type 1 floodplain forest and wet meadow, the site is bounded by the barge terminal, the river, and Type 1-4 wetlands. It is accessible by hydraulic dredge from Cut 7.
- 3.138 2.14 - This 110-acre portion of the Holman Field (St. Paul Downtown Airport) expansion is primarily Type 1-2 wet meadow with a 30-acre Type 3-4 marsh. It is accessible by hydraulic dredge from Cut 7.
- 3.139 2.15 - This 25-acre area on the north end of Holman Field at RM 838.1 is highly disturbed and has been used for disposal in the recent past. Because of past use and airport expansion plans, this site has limited capacity. It is accessible by hydraulic dredge from Cuts 7 and 8.
- 3.140 2.16 - A 5-acre site on the right bank of the river at RM 840.3, this is a disturbed area used for past disposal. The site is directly accessible by hydraulic dredge from Cut 9. However, due to the location and size of the site, it is more suited to mechanical dredging and disposal.
- 3.141 2.18 - This is a 17-acre commercial sand and gravel stockpile site on the left bank of the river at RM 843.4. It is bounded by the river, two roads, and a disturbed wetland. Use of this site would require mechanical dredging and disposal.
- 3.142 2.24 - This is a 15-acre site on three separate small islands on the right side of the river at RM 823.4. These islands have been used for previous disposal and are partially vegetated by bottom and hardwoods. On the back side of the island are large areas of Type 4-5 wetlands that constitute the upper end of Spring Lake. Continued use of this site would encroach on these wetlands. This site is directly accessible by hydraulic dredge from Cut 4.
- 3.143 2.25 - This is a 9-acre site on an island on the left side of the river at RM 823.5. Previously used for disposal, the island is partially revegetated. On the backside of the island are Type 3, 4, and 5 wetlands. Continued use of this site would result in expansion into these wetlands. This site is directly accessible by hydraulic dredge from Cut 4.
- 3.144 2.30 - A 3.5-acre area on a dredged material peninsula extending upstream from Lock and Dam 2, this site is vegetated primarily by shrubs and small to medium size trees. It is directly accessible by hydraulic dredge from Cut 1.
- 3.145 2.35 - This 25-acre upland meadow and pastureland site on the lower end of Lower Grey Cloud Island at RM 820.0 is used for grazing and some crop production. is accessible by hydraulic dredge from Cuts 2 and 3.
- 3.146 2.37 - This site is a 7-acre abandoned fly ash pit on the left bank of the river at RM 841.5. Although the site is accessible by hydraulic dredge from Cut 9, its size and location make this site more suitable to mechanical dredging and disposal.
- 3.147 2.40T - This is a proposal to develop a site on the inside of the bend of th river at RM 837. Development of this site would involve construction of a sheet-pile bulkhead in the river with disposal behind the bulkhead. This site would be directly accessible by hydraulic dredge from Cut 7.

### St. Croix River

3.148 SC.01, .03, .04, .05, .06 - These are a series of small islands adjacent to the channel at Hudson, Wisconsin, between RM 16.6 and 17.2. The islands are 7, 1, 1, 1, and 5 acres, respectively. They are in various stages of revegetation by willow brush, lack the adjacent marshes typical of many Mississippi River islands, and are heavily used by recreationists. These sites are directly accessible by hydraulic dredge from Cut 3.

3.149 SC.07 - This is an open water site between an island and the Wisconsin shore at RM 17.4. The purpose of disposal there would be to close off a bay from much of the river to create a backwater type situation, something unusual on the Lower St. Croix River. This site is accessible by hydraulic dredge from Cut 3.

3.150 SC.11 - This is a 2-acre site on Catfish Bar, an open sandbar on the left side of the river at RM 11.6. This site is directly accessible by hydraulic dredge from Cut 2.

3.151 SC.12 - This 17-acre old disposal site on the lower delta of the Kinnikinnic River is almost entirely revegetated by willow and small cottonwoods. It is directly accessible by hydraulic dredge from Cut 1.

3.152 SC.13 - This 9-acre site on the upper end of the Kinnikinnic River delta site is old disposal and sandbars revegetated by willows and young floodplain forest trees. It is directly accessible by hydraulic dredge from Cut 1.

3.153 SC.14 - This 1-acre disposal island below the Kinnikinnic River delta at RM 6.1 is privately-owned and has been revegetated by willows. Disposal would increase its size. This site is directly accessible by hydraulic dredge from Cut 1.

3.154 SC.15 - This is a 4-acre open water site at the southern tip of the Kinnikinnic River delta. The site would extend the delta and potentially connect it with the island that is site SC.14. This site is directly accessible by hydraulic dredge from Cut 1.

3.155 SC.16 - This is a 2.5-acre open water site off the Point Douglas Beach. The objective of disposal at this site would be to create an island as a complementary swimming area to the beach on Point Douglas near the mouth of the St. Croix River. Use of this site would require mechanical dredging and disposal of the material.

3.156 SC.18 - The purpose of disposal at this 4-acre open water site near the Minnesota shoreline at RM 18.0 would be to extend an exposed sandbar into the right shore of the river at RM 13. This site is directly accessible by hydraulic dredge from Cut 3.

3.157 SC.21 - This is a beach nourishment site at the Lake St. Croix Beach public beach on the right shore of the river at RM 13. Use of this site would require mechanical dredging and disposal of the material.

3.158 SC.22 - This is a generic site comprising potential use of the material at the Hudson Lakefront Park beach, upgrading of Lakefront Park, and use of a currently undeveloped beach in North Hudson. The communities are just beginning the process of developing park plans. Use of this site would require mechanical dredging and disposal of the material.

3.159 SC.24 - This 16-acre site at the Alan King Generating Station in Bayport, Minnesota, is disturbed and adjacent to the plant's coal pile. Use of this site would require mechanical dredging and disposal of the material.

3.160 SC.26 - This site is the Point Douglas Public Beach. Material would be placed here for beach nourishment. Use of this site would require mechanical dredging and disposal of the material.

3.161 SC.27 - This site is at Afton State Park. Material would be used in the park for fill or for beach nourishment. Use of this site would require mechanical dredging and disposal of the material.

3.162 SC.28 - This 10-acre site on the left side of the channel at RM 17.4 is an old disposal island nearly devoid of vegetation and heavily used by recreationists. It is directly accessible by hydraulic dredge from Cut 3.

#### Pool 3

3.163 3.07 - This 15-acre site on the right side of the channel at RM 799 consists of a 9-acre old disposal island, partially revegetated, plus 6 acres of open water on the back side of the island. This site is directly accessible by hydraulic dredge from Cut 1.

3.164 3.09 - This is a 35-acre rectangular site lying approximately 1,500 feet from the river on the Wisconsin side at RM 799.6. This site is mainly open grassy area with about 30 percent forest cover. The area is classified as a Type 1 wetland. It is bounded north and south by similar habitat. The landward side is bounded by railroad and the riverward side by a road and backwater slough. This site is accessible by hydraulic dredge from Cut 1. Pipeline access would need to be cut through bottomland hardwoods. With mechanical dredging, a small portion of Site 3.10 would provide a rehandling site.

3.165 3.10 - A long, narrow strip running along 4,500 feet of riverbank, this 14-acre riparian site on the left bank of the river at RM 799.7 is primarily bottomland hardwood with some meadow. This site is directly accessible by hydraulic dredge from Cut 1.

3.166 3.12 - Approximately one-half bottomland hardwoods and one-half open sandy area, this is a 12-acre site on the lower end of a long island at RM 801.8. On the back side of the island is a backwater area. This site is directly accessible by hydraulic dredge from Cuts 2 and 3.

3.167 3.14 - This 11-acre site on the right bank of the river at RM 802.6 runs about 2,500 feet along the river and is 200 feet wide. It is floodplain forest and marsh with about 3 acres of old disposal in early stages of revegetation. On the back side, it is bounded by bottomland hardwoods. This site is directly accessible by hydraulic dredge from Cuts 2 and 3.

3.168 3.16 - This 11-acre site on the right bank of the river at RM 803.2 runs about 2,000 feet along the river and is 250 feet wide. It is floodplain forest and is bounded on the back side by bottomland hardwoods. This site is directly accessible by hydraulic dredge from Cut 3.

3.169 3.21 - A Type 5 deepwater wetland, this is a 15-acre site lying behind the Burlington Northern Railroad tracks at RM 805.4. On the landward side, it is bounded by forest. This site is directly accessible by hydraulic dredge from Cut 4.

3.170 3.27 - This is a 31-acre site lying behind the Burlington Northern tracks at RM 808.4. Approximately one-half forested, one-half wet meadow (Type 1 wetlands), the site lies in the coulee of an intermittent stream. This site is accessible by hydraulic dredge from Cut 5 if crossing the Burlington Northern Railroad line can be accomplished.

3.171 3.28 - This 8-acre triangular site lying on the left bank of the river at RM 808.8 is floodplain forested and is bounded by the river, the Burlington Northern Railroad line and forest. This site is directly accessible by hydraulic dredge from Cuts 5 and 6.

3.172 3.30 - This 9-acre site is divided between an island and a peninsula at RM 809.9. Both are old disposal sites. The island is partially vegetated, while the peninsula is mostly forested. This site is directly accessible by hydraulic dredge from Cuts 6 and 7.

3.173 3.33 - This 14-acre rectangular site in the interior of Prescott Island at RM 811.3 is bottomland hardwoods, as is most of the island. The site is directly accessible by hydraulic dredge from Cut 7.

3.174 3.34 - This 10-acre site on the left bank of the river at RM 812 is a pothole lying behind the Burlington Northern tracks and up against the bluff. It contains a 4-acre Type 4-5 wetland, with the remainder of the site wooded. It is accessible by hydraulic dredge from Cut 7 if a crossing of the Burlington Northern tracks can be achieved.

3.175 3.40 - This 15-acre rectangular site on the right bank of the river at RM 806.9 extends 1,600 feet along the river and approximately 400 feet inland. It is floodplain forest bounded by bottomland hardwoods. This site is directly accessible by hydraulic dredge from Cut 5.

3.176 3.42 - This is an 8.5-acre beach nourishment site on the left bank of the river at RM 814.7. The beach nourishment extends 3,500 feet along the river. This site is accessible by hydraulic dredge from Cut 9.

3.177 3.43 - Primarily bottomland hardwoods, this is a 1-acre site on the right bank of the river at RM 799.4. Disposal at this site would include 500 feet of beach nourishment. This site is directly accessible by hydraulic dredge from Cut 1.

3.178 3.44 - This 2-acre beach nourishment site on the right bank of the river at RM 805.5 runs 1,050 feet along the river. It is directly accessible by hydraulic dredge from Cut 4.

3.179 3.46 - This 11-acre site on the right bank of the river at RM 813.2 is an agricultural field bounded by bottomland hardwoods. This site is directly accessible by hydraulic dredge from Cut 8.

3.180 3.47 - This is a 1.5-acre disturbed area on the right bank of the river at RM 814.7 used as a parking lot by people watching boat traffic at Lock and Dam 2. Due to the size and location of this site, use of it would require mechanical dredging.

3.181 3.48 - This is a proposed park development at Lake Rebecca below Lock and Dam 2. If the park is developed there is the outside possibility of using dredged material in the park for fill purposes. Due to the location and nature of this site, use of it would require mechanical dredging. Site 3.47 (see above) could serve as a rehandling site.

#### Pool 4

3.182 4.02 - This is a 10-acre open water site at the Alma Small Boat Harbor at RM 753.8. The material would be placed behind a sheetpile bulkhead. This site is directly accessible by hydraulic dredge from Cut 1.

3.183 4.04 - A 10-acre area adjacent to the Alma Small Boat Harbor, this site is a relatively open sandy area with scattered clumps of trees and is proposed for recreational development by the City of Alma. It is directly accessible by hydraulic dredge from Cut 1.

3.184 4.10 - This is a 25-acre site on an island on the left side of the channel at RM 756.5. A 4-acre prepared disposal site is on this island. This site is directly accessible by hydraulic dredge from Cut 2 and 3.

3.185 4.13 - This 70-acre bermed containment site on a large island along the left side of the channel at RM 757.6 is a prepared disposal site. If expanded, it would encroach upon bottomland hardwoods and backwater sloughs. This site is directly accessible by hydraulic dredge from Cuts 2 and 3.

3.186 4.16 - This is a 60-acre existing disposal site on the left bank of the river at RM 759.1. If expanded, it would encroach upon bottomland hardwoods and backwater sloughs. This site is directly accessible by hydraulic dredge from Cut 4.

3.187 4.18 - This 3-acre site adjacent to a marina in Wabasha, Minnesota, is currently used as a dredged material stockpile site. Due to the size and location of this site, use of it would in all likelihood require mechanical dredging and disposal of the material.

3.188 4.19 - This is a 6-acre site in a small gravel pit lying behind a marina in Wabasha, Minnesota (same marina as in site 4.18). Due to its size and location, use of this site would probably require mechanical dredging and disposal.

3.189 4.20 - This 10-acre site in Wabasha, Minnesota, at RM 759.6, is adjacent to the river, is bottomland hardwoods disturbed by development and is a past dredged material disposal area. It is directly accessible by hydraulic dredge from Cut 4.

3.190 4.24 - This is a 60-acre site in an abandoned sandpit about 1,500 feet from the river on the Minnesota side at RM 762.6. This site would be accessible from Cut 5 by hydraulic dredge only with the addition of extra pipeline and booster pumps. Installation of this equipment is being considered for this site since it is near the largest volume dredge cut in the GREAT I study area, Read's landing (Cut 5).

3.191 4.25 - This is an 18-acre site in an abandoned revegetated sandpit about 500 feet from the channel on the Minnesota side at RM 762.6. This site is accessible by hydraulic dredge from Cut 4.

3.192 4.29 - This is a 55-acre existing disposal site on the left bank of the river at RM 753. Expansion of this site would encroach upon bottomland hardwoods and backwater sloughs. This site is accessible by hydraulic dredge from Cut 5.

3.193 4.37 - An 8-acre area approximately 1 mile from the river on the Minnesota side at RM 785, this site is an abandoned gravel pit which has reverted to Type 1-2 wetlands. Use of this site would require mechanical dredging, barging, and trucking of the material to the site. Site 4.48 would be a potential rehandling site.

3.194 4.38 - This 5-acre site approximately 1.5 miles from the river on the Minnesota side at RM 785 is an active gravel pit used by the Minnesota Department of Transportation. Use of this site would require mechanical dredging, barging, and trucking the material to this site. Site 4.48 (see below) would be a potential rehandling site.

3.195 4.39 - A 37-acre forested rectangular site on the Minnesota shoreline of Lake Pepin at RM 785.2, this site lies 600 feet from the lake. On the back side, it is bounded by the bluffs. This site is directly accessible by hydraulic dredge from Cut 6.

3.196 4.47 - This 11-acre site at Colville Park in Red Wing, Minnesota, at RM 788.7 is primarily bottomland hardwoods. Because this site is in a park, use of a mechanical dredge is more likely since hydraulic dredging would require diking and substantial tree clearing.

3.197 4.48 - This 8-acre site lying on a peninsula below the Red Wing power plant at RM 789.3 bottomland hardwoods with some interspersed wet meadows. This site is directly accessible by hydraulic dredge from Cut 7.

3.198 4.49 - This is an 8-acre site on an island on the right side of the channel at RM 790. The site and the island are bottomland hardwoods. The site covers about 20 percent of the island. This site is directly accessible by hydraulic dredge from Cut 7.

3.199 4.52 - This 35-acre site on the left bank of the channel at RM 791.5 is approximately 3,200 feet by 500 feet. It is bottomland hardwoods and is bounded by additional forest area. This site is directly accessible by hydraulic dredge from Cuts 8 and 9.

3.200 4.54 - Primarily upland meadow and disturbed Type 1-3 wetland, this 8-acre site is adjacent to the Red Wing Commercial Harbor at RM 791.5. It fronts on the harbor with developed areas behind it and is projected for development by the City of Red Wing. This site is accessible by hydraulic dredge from Cut 8.

3.201 4.55 - This 10-acre site adjacent to the Red Wing Commercial Harbor is a Type 5 wetland highly disturbed by landfill encroachment. This site is accessible by hydraulic dredge from Cut 8.

3.202 4.56 - Bounded on the back side by marsh and the old Red Wing sanitary landfill, this 10-acre bottomland hardwood site is adjacent to the river and the Red Wing Commercial Harbor at RM 791.6. It is directly accessible by hydraulic dredge from Cuts 8 and 9.

3.203 4.57 - This highly disturbed 16-acre site at the Red Wing sanitary landfill is no longer in active use. This site is not readily accessible by hydraulic dredge. Use of the site would require mechanical dredging and barging of the material. Barges could be unloaded in the Red Wing Commercial Harbor and the dredged material trucked to the site.

3.204 4.58 - This 16-acre site on the right bank of the river at RM 792.4 runs along the river for 1,400 feet and is 500 feet deep. It is bottomland hardwoods, has been used for disposal in the past, and is bounded on the back by a large backwater slough. This site is directly accessible by hydraulic dredge from Cut 9.

3.205 4.59 - This area is a beach nourishment site along 4,000 feet of left bank shoreline at RM 793.2. The frontage along this stretch of river is residentially developed. This site is directly accessible by hydraulic dredge from Cut 9.

3.206 4.60 - This is a beach nourishment site along 5,000 feet of right bank shoreline at RM 793.4. The shoreline is undeveloped bottomland hardwoods. This site is directly accessible by hydraulic dredge from Cut 9.

3.207 4.63 - This 7-acre area on the right bank of the river at RM 794.3 is a revegetated disposal site bounded by the river and a backwater area. It is directly accessible by hydraulic dredge from Cut 10.

3.208 4.67 - This is a 6-acre site on the right bank of the river at RM 796.7. The site is bottomland hardwoods that has been disturbed to some extent. The back side of the site abuts a creek. This site is directly accessible by hydraulic dredge from Cut 11.

3.209 4.69 - This 6-acre open water site north of the Alma Small Boat Harbor at RM 753.8 abuts the boat harbor and the railroad dike. The site is directly accessible by hydraulic dredge from Cut 1.

3.210 4.68 - A 21-acre site on a peninsula at the head of Lake Pepin, this site is primarily bottomland hardwoods with some Type 3-4 wetlands on the off-channel side. The site is directly accessible by hydraulic dredge from Cut 6.

3.211 4.69b - This 50-acre site is on an island and in open water on the left side of the channel at RM 785.3. The open water disposal would take place on the back side of the island. The site is directly accessible by hydraulic dredge from Cut 6.

Pool 5

3.212 5.03 - This is an 8-acre site on the right side of the channel at RM 741.5. It encompasses a 2-acre dredged material island and a 6-acre open water disposal area to connect the island with the mainland. This site is designed for recreation and fish and wildlife enhancement. It is accessible by hydraulic dredge from Cut 1.

3.213 5.06 - This 16-acre dredged material island on the right side of the channel at RM 743.4 is about 3,000 feet long and averages 250 feet wide. The island has scattered patches of trees. Continued use would result in additional open water encroachment. This is directly accessible by hydraulic dredge from Cuts 2 and 3.

3.214 5.07 - About 2,000 feet long and 500 feet wide, this 20-acre site covers most of a dredged material island on the right side of the channel at RM 744.0. The island has scattered trees on it. Use of this site for disposal would result in additional open water encroachment. This site is directly accessible by hydraulic dredge from Cuts 2 and 3.

3.215 5.12 - This 24-acre site (2,200' X 500') on the right bank at RM 745.9 has been used previously and is partially revegetated. A 14-acre prepared containment area has been built on this site. Continued use of the site would result in encroachment on backwater sloughs and marshes on the back side of the site. This site is directly accessible by hydraulic dredge from Cuts 4, and 5.

3.216 5.14 - This is a 16-acre site (1,600' X 500') on the right bank of the river at RM 747.1. The site has been used for disposal in the past and is partially revegetated. Continued use of the site would result in encroachment on backwater sloughs and marshes on the back side of the site. This site is directly accessible by hydraulic dredge from Cuts 4, 5, and 6.

3.217 5.18 - A prepared containment area, this is a 27.5-acre (2,200' X 550') site on the right bank of the river at RM 748.0. Continued use of this site would lead to encroachment on backwater sloughs and marshes on the back side of the site. This site is directly accessible by hydraulic dredge from Cuts 6 and 7.

3.218 5.21 - This 16-acre site (2,500' X 300') on the right bank of the river at RM 749.1 is bottomland hardwoods with numerous sloughs and marshes on the backside. It is directly accessible by hydraulic dredge from Cut 7.

3.219 5.24 - Bounded by other agricultural land, this 36-acre site on the Minnesota side of the river lies approximately 3,200 feet from the river at RM 750.2. Use of this site would require mechanical dredging, barging, and trucking of the material. Because there is no readily available rehandling site available, use of the site could require dredging a 1000-foot barge access channel through backwaters to reach the site.

3.220 5.25 - This 3-acre site on an island immediately below Lock and Dam 4 is bottomland hardwoods, as is much of the rest of the 60-acre island. This site is readily accessible by hydraulic dredge from Cut 8.

3.221 5.26 - This 15-acre site lying within the rail loop at the Alma Generating Station at RM 751.6 is a mixture of bottomland hardwoods and backwaters. Use of this site would require mechanical dredging and barging of the material to the site.



3.222 5.26 - This alternative involves the stockpiling of dredged material at the Alma Generating Station, with the material subsequently loaded on rail car or barges and transported elsewhere for beneficial use. At this time, it is estimated that approximately 15 acres of floodplain forest would be needed as a stockpile site. This alternative requires further feasibility study. Use of this site would require mechanical dredging and barging of the material to the site.

3.223 5.28 - This is a 15-acre site located in an old gravel pit lying approximately 1 mile from the channel on the Wisconsin side of the river at RM 747.3. The site is vegetated by upland meadow vegetation. Use of this site would require mechanical dredging and barging of the material to this site. An approximately 3600-foot barge access channel would have to be dredged through shallow water to reach the site.

3.224 5.30 - This series of side channel closures along the right side of the channel at RM 744-745.4 is proposed to implement the Weaver Bottoms rehabilitation plan. These sites are directly accessible by hydraulic dredge from Cuts 2, 3, and 4.

#### Pool 5A

3.225 5A.04 - This is an 8-acre site encompassing an island immediately upstream of Lock and Dam 5A. The island is partially forested, partially open sandy areas. This site is directly accessible by hydraulic dredge from Cut 1.

3.226 5A.08 - This is a 15-acre site in two locations on a peninsula on the left side of the river at RM 730.5. These locations have been used for disposal in the past and are partially revegetated. Continued use of this site could cause incroachment on backwater areas behind the previously-used disposal areas. This site is directly accessible by hydraulic dredge from Cuts 1 and 2.

3.227 5A.14 - Previously used for disposal, this is a 32-acre site on the left bank of the river at RM 734.3. The bulk of the site is forested. This site is directly accessible by hydraulic dredge from Cut 5.

3.228 5A.20 - This 18-acre site on the Wisconsin side of the river at RM 736 is cropland and upland meadow and lies about 1.0 mile from the channel. The site is bounded by similar areas. Use of this site would require mechanical dredging, barging, and trucking the material to the site.

3.229 5A.21 - This 12-acre site on the Wisconsin side of the river at RM 736.4 is cropland and upland meadow and lies about 1.2 miles from the channel. The site is bounded by upland meadow on one side and by bottomland hardwoods and deep marsh on its other side. Use of this site would require mechanical dredging, barging, and trucking the material to the site.

3.230 5A.23 - This 7-acre site on the right bank of the river at RM 737.5 is bottomland hardwoods adjacent to the Bass Camp resort development. This site is directly accessible to hydraulic dredge from Cut 6.

3.231 5A.25 - Lying along the left bank of the river at RM 732, this 6-acre site follows the river for 1,000 feet and consists of previously filled bottomland hardwoods. This site is directly accessible by hydraulic dredge from Cuts 1-4.

3.232 5A.27/.33 - This 8-acre site lying between the Burlington Northern Railroad and State Trunk Highway 25 at RM 732.2 is previously disturbed upland meadow. Use of this site would require mechanical dredging, barging, and trucking the material to the site.

3.233 5A.32 - This 34-acre site lying between the Burlington Northern tracks and S.T.H. 25 at RM 731.8 is 5 acres of bottomland hardwoods and 29 acres of Type 3-4 deep marsh. Although this site is within reach by hydraulic dredge from Cuts 2 and 3, pipeline access across site 5A.25 and the Burlington Northern Railroad line would have to be developed.

3.234 5A.34 - An 18-acre area on the left bank of the river at RM 733.5, this site consists of 12 acres of bottomland hardwoods, with the remainder in Type 2, 3, and 4 wetlands. The site is bounded almost entirely by open water and deep marshes. This site is directly accessible by hydraulic dredge from Cuts 4 and 5.

3.235 5A.35 - This is a 52-acre open water site lying one-half mile from the channel at RM 729.7 that is an island creation site in Polander Lake for the purpose of a wildlife habitat enhancement. This site is accessible by hydraulic dredge from Cuts 1 and 2. The pipeline would have to be placed across 2500 to 3000 feet of shallow water and stump field.

3.236 5A.36 - Primarily open grass with scattered trees, this is a 2-acre site at Lock and Dam 5. It is the former site of some residential buildings of the lock and dam complex. Its use would require mechanical dredging and barging of material.

#### Pool 6

3.237 6.11 - This 7-acre site on the right bank of the river at RM 720.6 is primarily open land with scattered trees. This site is directly accessible by hydraulic dredge from Cuts 1 and 2.

3.238 6.14 - This is a 7-acre site divided between a small island and the left bank at RM 722. The island is about 1 acre in size and sparsely vegetated. The area on the bank is primarily bottomland hardwoods bounded on the back side by a backwater slough. This site is directly accessible by hydraulic dredge from Cut 2.

3.239 6.16 - This 8-acre rectangular, Type 2, 3, and 4 wetland site on the right side of the river at RM 723.2 lies about 700 feet from the river. It is bounded on its two long sides by a road and industrial development. This site is accessible by hydraulic dredge from Cut 3. The pipeline would have to be placed across 300 to 400 feet of wetlands and a road.

3.240 6.17 - This 21-acre site lying about 3,000 feet from the river at RM 723.5 is a large Type 3-4 wetland being proposed for development by the City of Winona. Although it is within reach by hydraulic dredge, due to the obstacles to connecting a pipeline to the site, its use would probably require mechanical dredging and trucking the material.

3.241 6.19/.20 - This site covers two 2.5-acre areas in Winona at RM 724.5. Near the river but behind the flood levee, they are highly disturbed areas used for disposal in the past. This site is accessible by hydraulic dredge from Cut 4.

3.242 6.27 - This 0.5-acre stockpile site at the Winona Municipal Harbor at RM 726.0 is disturbed and has been used to stockpile dredged material in the past. Due to its size and location, use of this site would require mechanical dredging and barging of the material.

#### Pool 7

3.243 7.01 - This disturbed 1-acre site on the right bank of the river at RM 705.3 in Dresback, Minnesota, has been used as a dredged material disposal area. Because the site is too small for hydraulic disposal, use of this disposal area would dictate mechanical dredging.

3.244 7.04 - A 32-acre area on the left bank of the river at RM 712, this site is primarily floodplain forest with a 2-acre Type 3-4 wetland in its center. On the back side is a backwater slough and floodplain forest. This site is directly accessible by hydraulic dredge from Cut 6.

3.245 7.05 - This 12-acre site on the right bank of the river at RM 713.6 consists of some abandoned fish ponds, bottomland hardwoods, and disturbed areas. The Minnesota Department of Natural Resources proposes a public access there. The site is accessible by hydraulic dredge from Cuts 6 and 7.

3.246 7.06 - This 21-acre site on the left side of the river immediately below Lock and Dam 6 at RM 714 consists of some old fish ponds that have reverted to Type 4-5 wetlands. The old dikes between the ponds are covered by trees. This site is directly accessible by hydraulic dredge from Cut 7.

3.247 7.10 - Previously used for disposal, this is a 7-acre site on an island on the left side of the channel at RM 711. The site includes 1 acre of Type 4 wetlands. Continued use of this site would encroach upon Type 3, 4, and 5 wetlands on the back side of the site. This site is directly accessible by hydraulic dredge from Cuts 5 and 6.

3.248 7.11 - This is a 59-acre site divided into two parts lying on both sides of the channel at RM 708.6. The left bank portion is 28 acres of floodplain forest with some old disposal area (8 acres). The back side of the area is Type 3-4 wetlands. The right bank portion of the site is a beach nourishment site along 1,000 feet of shoreline. This site is directly accessible by hydraulic dredge from Cut 4.

3.249 7.12 - Divided between three wooded island areas at RM 706.7, this 15-acre site has been used for disposal in the past. The continued use of these areas would encroach on open water and wetlands. One of the islands has a 6.4-acre prepared containment area. This site is directly accessible by hydraulic dredge from Cut 3.

3.250 7.13 - This 39-acre site composed of revegetated dredged material and floodplain forest lies on the upper end of an island on the left side of the channel at RM 705. The off-channel and downstream sides of the island are deepwater marsh and open water areas. This site is readily accessible by hydraulic dredge from Cut 2.

3.251 7.20 - A 2-acre area at Lock and Dam 7, this site lies on the west side of the river immediately above the lock chamber. The site is maintained in grass with some tree plantings. Use of this site would be likely to require mechanical dredging because it is unsuited for hydraulic disposal due to its size and location.

#### Pool 8

3.252 8.01 - This is a 10-acre site on the left shore of the river at RM 685.5 about 4,200 feet from the main channel. It is primarily bottomland hardwoods bordered on the front by shallow open water and on the back by agricultural land. This site is accessible by hydraulic dredge from Cut 2. The pipe would have to be placed across about 4000 feet of shallow water and stump fields. Barge access would have to be dredged through this same area if mechanical dredging were used.

3.253 8.02 - This site covers 55 to 80 acres depending on its configuration, on the right bank of the river at RM 688.3. The site is primarily Type 3-4 wetlands with some small intermixing of bottomland hardwoods. This site is readily accessible by hydraulic dredge from Cuts 3, 4, and 5.

3.254 8.06 - This 44-acre disturbed site on Isle La Plume at La Crosse, Wisconsin, at RM 696 fronts on the river and is bounded on the other sides by developed areas. Due to the site's location away from the historic dredge cuts, material would have to be mechanically dredged and barged there.

3.255 8.15 - A 12-acre area on the left bank of the river at RM 694.7, this site has been used for disposal in the past. The site is bottomland hardwoods bounded on the back side by backwater marshes. It is readily accessible by hydraulic dredge from Cut 9.

3.256 8.17 - This is a 32-acre area on three small islands bracketing the channel at RM 690.4. The areas are revegetating old disposal sites bounded by the main channel and by backwater sloughs and marshes. An 8.5-acre prepared containment area has been constructed on one of the islands. These sites are readily accessible by hydraulic dredge from Cuts 6 and 7.

3.257 8.20 - This 7-acre site, a partially revegetated disposal island on the left side of the channel at RM 686.6, is bounded by the channel and Type 4-5 deep open marsh. It is directly accessible by hydraulic dredge from Cuts 3 and 4.

3.258 8.22 - This site is a 4-acre agricultural area on the left side of the river at RM 685.5 about 4,000 feet from the channel. This site is marginally accessible by hydraulic dredge from Cut 2. The pipeline would have to be laid across 4,000 feet of shallow water and stump field. Barge access would have to be dredged through this same area if mechanical dredgings were used. Use of this site also would likely require a rehandling site in open water.

3.259 8.28 - This site is a developed area on the right bank of the river at RM 700. Area residents have requested material for fill around building foundations and for beach nourishment. If beach nourishment is undertaken, the site would be directly accessible by hydraulic dredge from Cut 10. Use of the material around buildings would generally require mechanical dredging, however.

3.260 8.30 - This 55-acre site on the right bank of the river at RM 688.5 consists of approximately 22 acres of existing disposal site, 22 acres of bottomland hardwoods, and 11 acres of Type 3-4 deep marsh. The site could be used in progressive stages to delay impacts on wetlands as long as possible. This site is directly accessible by hydraulic dredge from Cuts 3, 4, and 5.

3.261 8.31 - This is a 3-acre Type 4 deep marsh site on the left side of the channel at RM 683.5. Filling of this area would eventually create a small island. This site is directly accessible by hydraulic dredge from Cut 1.

#### Pool 9

3.262 9.03 - This 4-acre baseball field within Lansing, Iowa, lies about 200 feet from the river at RM 663. The size and location of this site would generally require the use of mechanical dredging.

3.263 9.04 - This is a 14-acre site on the left bank of the river at RM 663.6 along the inside of the bend at Lansing, Iowa. Roughly triangular, the site is primarily bottomland hardwoods with some marsh present. It is directly accessible by hydraulic dredge from Cut 3.

3.264 9.07 - This 15-acre site lying landward of S.T.H. 35 at RM 687.5 is disturbed upland, bottomland hardwoods, and 10 acres of deep marsh. Due to its location, use of this site would generally require the use of mechanical dredging.

3.265 9.08 - A 1.5-acre site lying landward of S.T.H. 35 at RM 687.6, this site is an old field with a commercial building on it. Due to its size and location, use of this site would require mechanical dredging.

3.266 9.11 - This 5-acre site on the left bank of the river at RM 671.7 is bottomland hardwoods that have been disturbed by previous disposal activities. It is directly accessible by hydraulic dredge from Cut 6.

3.267 9.15 - This is a highly disturbed 1-acre site at the Genoa Generating Station at RM 678.0. The size and location of the site render it unsuited for hydraulic disposal. Material would be unloaded from barges onto this site where it would be removed for beneficial use or transported to Site 9.40 (see below).

3.268 9.17 - This is a 4-acre prepared bermed containment site on a 20-acre island on the right bank of the river at RM 664.3. The island itself was used for disposal in the past. The island is bounded on the backside by deepwater marsh area.

3.269 9.18 - This 23-acre (2000' X 500') site on the right bank of the river at RM 666.0 is entirely bottomland hardwoods. A small (2-3 acres) portion of the site has been used for disposal in the past. Behind the site are backwater sloughs and marshes. It is directly accessible by hydraulic dredge from Cut 4.

- 3.270 9.20 - This is a 30-acre island at RM 676.0. About 15 acres of the island have been used for disposal but are partially revegetated. The remainder of the island is bottomland hardwoods and Type 3-4 wetlands. The site is directly accessible by hydraulic dredge from Cut 8.
- 3.271 9.21 - This 10-acre site on the right bank of the river at RM 678.1 has been used for disposal in the past. It is primarily bottomland hardwoods bounded by additional forest area. The site is directly accessible by hydraulic dredge from Cuts 9 and 10.
- 3.272 9.26 - This is a 22-acre site adjacent to a marina at Lansing, Iowa, at RM 664. There is a proposal to expand the existing marina into Type 4 wetlands. If the marina is expanded, dredged material could be used as fill material in the construction of a breakwater.
- 3.273 9.28 - This 33-acre site on the right bank of the river at RM 662.1 is Type 3, 4, and 5 wetland and is being considered for development as a marina by the Iowa Conservation Commission. Use of this site would require mechanical dredging. Barges would be unloaded adjacent to the site.
- 3.274 9.33 - This 13-acre site lying between the river and S.T.H. 35 at RM 671.4 is bottomland hardwoods bounded by additional forest areas. The site is accessible by hydraulic dredge from Cut 8. Access would be through Site 9.11 (see above) or via a 700- to 1000-foot access corridor cut through bottomland hardwoods.
- 3.275 9.34 - This is a site on a few small islands on both sides of the channel at RM 654.0. These islands are primarily Type 3-4 deep marsh. Disposal on these would also encroach on open water. This site is directly accessible by hydraulic dredge from Cut 1.
- 3.276 9.36 - Primarily bottomland hardwoods bounded by additional forest and backwater marshes, this is an 8-acre site on the right bank of the river at RM 668. It is directly accessible by hydraulic dredge from Cut 5.
- 3.277 9.38 - A 13-acre area in the right bank of the river at RM 676.9, this site is vegetated by bottomland hardwoods and surrounded by additional floodplain forest areas. It is directly accessible by hydraulic dredge from Cut 8.
- 3.278 9.39 - This is an 11-acre site on the right bank of the river at RM 679.0. It is primarily bottomland hardwoods with a 1-acre parcel of marsh and is bounded by bottomland hardwoods. The site is directly accessible by hydraulic dredge from Cuts 9 and 10.
- 3.279 9.40 - This 5-acre site about 3,000 feet from the main channel on the Wisconsin side at RM 677.6 lies adjacent to the Burlington Northern Railroad line. The site is bottomland hardwoods bounded by similar habitat. Use of this site would very likely require mechanical dredging. The site is within hydraulic dredge reach of Cut 9, but access via pipeline would be difficult. Site 9.15 (see above) could serve as a rehandling site for site 9.40.

3.280 9.41 - An 8.5-acre area on the left bank of the river at RM 652.3, this wooded site lies landward of S.T.H. 35 in the mouth of a very small coulee. Use of this site would require mechanical dredging and trucking material the site. No rehandling site has been identified.

3.281 9.42 - This is an 11-acre triangular site lying 1,000 feet from the river and behind the Lansing Generating Station at RM 660.4. The site is bounded on two sides by roads and is upland meadow with some areas of forest. It lies within hydraulic dredge reach of Cut 2. Access for the pipeline would pass through bottomland hardwoods and have to cross the Milwaukee Road Railroad line. With mechanical dredging, material could be unloaded at Site 9.47 (see below) and trucked to this site.

3.282 9.45 - This site would involve the use of dredged material at the Genoa Fish Hatchery to redesign the fish ponds. Use of this site would require mechanically dredging the material and trucking it to the site.

3.283 9.47 - This 1-acre site at the Lansing Generating Station at RM 660.1 is highly disturbed and would be a stockpile site. It could only be used with mechanical dredging due to its size and location. Material would be barged to the site and directly unloaded.

#### Pool 10

3.284 10.01 - An 8-acre area in an old gravel quarry on the Wisconsin side of the river at RM 628.0, this site lies 400 feet from the river. It could be used by hydraulic dredge from Cut 3 if access under the Burlington Northern Railroad line and S.T.H. 35 could be developed. Mechanical dredging would use site 10.24 (see below) as a rehandling area for this site.

3.285 10.02 - This 6-acre site in the city of Guttenberg, Iowa, is an open area bounded by developed areas and wetlands. Use of this site would require general mechanical dredging and trucking the dredged material.

3.286 10.03 - This 10-acre site on the north end of Guttenberg, Iowa, is an old open field bounded by a railroad and highway about 800 feet from the river. Use of this site would require mechanical dredging and trucking of the dredged material.

3.287 10.04 - This is an 8-acre site in a sand and gravel pit on the Iowa side of the river at RM 618.6. The site lies about 4000 feet from the channel and can be reached by hydraulic dredge from Cut 2 if the material is double-handled in the water.

3.288 10.09 - This is a 13-acre site on the southern end of St. Friole Island in Prairie du Chien, Wisconsin, at RM 634.9. The entire island is eligible for inclusion in the National Register of Historic Places. This site is a previously used disposal site adjacent to developed properties and is accessible by hydraulic dredge from Cut 6.

3.289 10.14 - This 16-acre site in the floodplain of DuCharme Creek and behind S.T.H. 35 at RM 644.4 is bottomland hardwoods is bounded by bluffs and S.T.H. 35

The site could be used by hydraulic dredging from Cut 8 if access under the Burlington Northern Railroad and S.T.H. 35 can be developed. Mechanical dredging would use site 10.15 (see below) as a rehandling area for this site.

3.290 10.15 - A 1.2-acre area on the left bank of the river at RM 644.5, this site is bottomland hardwoods and could serve as a rehandling site for dredged material.

3.291 10.16 - This 6-acre site on the left bank of the river at RM 646.5 abuts against the Burlington North Railroad line and is bounded on the north and south by open water and wetlands. The site itself is bottomland hardwoods. It can be used by hydraulic dredge from Cut 9. Access for the pipe would be across a small side channel.

3.292 10.17 - This 4-acre site on the left bank of the river at RM 647.0. The site is bottomland hardwoods bounded by the Burlington Northern Railroad line and a large backwater slough. It can be used by hydraulic dredge from Cuts 9 and 10.

3.293 10.18 - This 9-acre island site on the right side of the channel at RM 618.9 is about half forest, half marsh. The site is directly accessible to use by hydraulic dredge from Cut 2.

3.294 10.20 - This 6-acre (600' X 400') site on the left bank of the river at RM 629.1 is bottomland hardwoods with 1 acre of backwater slough (Type 3). The site is bounded by forest and backwater sloughs. It can be reached by hydraulic dredging from Cut 4.

3.295 10.21 - This is a 6-acre site on an 8-acre island on the left side of the channel at RM 633.7. The island is wooded with some marsh on its off-channel side. Disposal would encroach on these marshes and open water. The site is directly accessible to use by hydraulic dredge from Cut 5.

3.296 10.22 - This is a 20-acre site on the right bank of the river at RM 644.8. The area has been used for disposal previously but still retains much of its tree cover. The site is bounded by bottomland hardwoods and is directly accessible by hydraulic dredge from Cut 8.

3.297 10.23 - This 8-acre site on the left bank of the river at RM 646.4 is bottomland hardwoods bounded on three sides by open water and sloughs. It is directly accessible to use by hydraulic dredge from Cut 9.

3.298 10.24 - This 1-acre on the left bank of the river at RM 627.9 would be a rehandling site for 10.01. The site is at the Wyalusing Public Access and is somewhat disturbed.

3.299 10.30 - A 15-acre area on the left bank of the river at RM 642.8, this site is primarily bottomland hardwoods with about a 5-acre deepwater marsh (Type 3-4) in the center. The site is bounded by forest and the Burlington Northern Railroad line and is directly accessible to use by hydraulic dredge from Cut 7.

3.300 10.33 - This is a 4-acre open water site at RM 615.8. It is proposed to create an island there to serve as a lockage waiting area for recreational craft. The site is directly accessible by hydraulic dredge from Cut 1.

3.301 10.40 - An agricultural field bounded by forest, fields, and the Burlington Northern Railroad line 1500 feet from the channel, this site covers 25 acres



on the Wisconsin side of the river at RM 642.7. The site can be reached by hydraulic dredging from Cut 7, but this access would require clearing a 1500-foot access corridor through bottomland hardwoods.

3.302 10.41 - This is a 5-acre site on the right side of the river at RM 634.7 about 1,000 feet from the river. In an area disturbed in the past, the site is now vegetated by grasses, sedges, and willows. Use of this site would require mechanical dredging and trucking.

#### 4.000 ENVIRONMENTAL EFFECTS

##### GENERAL

4.001 This section presents the identifiable environmental impacts of the GREAT I recommended actions and alternatives. GREAT I has developed a number of implementable recommendations - "Action Items," recommendations for policy and funding level changes - "Policy/Funding Items," and recommendations for further studies - "Further Study Items." These recommendations have also been categorized by general subject; i.e., channel maintenance, fish and wildlife, recreation, commercial transportation, etc.

4.002 This section first discusses the impacts of the Dredged Material Placement Plan (Action Item 1) which is the major work product of the GREAT I Team. Following that are discussions of the impacts of the other GREAT I recommendations and alternatives by subject.

4.003 This EIS uses the tiering concept (40 CFR 1502.20) because many of the GREAT I recommendations are general in nature (see paragraphs 1.005-1.008). State and Federal agencies implementing the recommendations must prepare additional environmental documents when specific actions are proposed. Section 5.00 of this document outlines further environmental documentation likely to be required.

##### ACTION ITEM 1 - DREDGED MATERIAL PLACEMENT PLAN (DMPP)

4.004 The evaluation of the impacts of the DMPP centers around the alternative dredged material placement sites considered in the final development of the DMPP. The initial discussion of the impacts of dredged material disposal that are common throughout the study area is followed by a pool-by-pool discussion of the impacts of the alternative placement sites.

##### Impacts Throughout the Study Area

###### Fish and Wildlife

4.005 The following is a general discussion of the impacts of dredged material disposal on fish and wildlife and their habitat.

4.006 Impact of Using Existing Disposal Sites or Previously Used Emergent Sandbars for Dredged Material Disposal - Existing dredged material and emergent sandbar areas do provide some habitat for wildlife. The value of the habitat depends upon the degree of revegetation which has occurred. Small furbearing mammals, fox, upland game birds, and turtles are examples of the wildlife species which would use this type of area. Using these areas for further dredged material disposal disturbs the areas substantially for several years and displaces most wildlife until suitable vegetation can regain a foothold in the areas. In cases where large containment sites are constructed, the habitat values would be near-totally lost at the site for many years.

4.007 Impact of Using Type 3 and 4 Wetlands for Disposal Sites - Type 3 and 4 wetlands are the most valuable and productive fish and wildlife habitat in the river floodplain. Nearly all wildlife and fishes using the river depend on this type of wetland for some portion or all of their life cycle. Use of this type of habitat for dredged material disposal for all practical purposes eliminates the current habitat values of the areas and transforms them into much less valuable sandbar habitat.

4.008 Impact of Using Type 1 and 2 Wetlands for Disposal Sites - Type 1 and 2 wetlands are of significant habitat value year-round to wildlife and of some value to fishes seasonally. Due to the transitional character of the habitat, these wetlands provide many elements necessary to the survival of furbearers, deer, fox, upland game birds, and other wildlife. During persistent high water periods, Type 1 and 2 wetlands provide spawning areas for northern pike and for bowfin, gar, and carp. Use of this type of habitat for dredged material disposal would displace the fish and wildlife species using the area and ultimately result in a net loss of species diversity and abundance.

4.009 Impact of Using Openwater Areas in the Main Channel Border for Dredged Material Disposal - The main channel border of the river provides exceptionally good fish habitat. Predator and forage fish use the habitat for feeding, and some fishes use the area for spawning. If a submergent wing dam exists in the area, the habitat value is substantially greater, especially for feeding activities. As a general rule, use of an openwater area for disposal greatly reduces the habitat value of the area by covering the substrate colonized by food organisms. When used for disposal, such areas generally change from good fish habitat to emergent sandbars.

4.010 Impacts of Using Type 5 Wetland Areas for Dredged Material Disposal - Waterfowl and furbearers use shallow (water depths 3-10 feet) pond habitat for feeding areas and areas to raise young. Depending on size, such ponds may produce one brood or more of wood duck, mallard, or teal each year, as well as numerous muskrats. Beaver also may colonize and produce young there if the ponds are sufficiently large and undisturbed. Filling such ponds by disposal destroys the area's ability to support any of these species. In the study area, fish use of these ponds is generally limited due to winterkills caused by deep ice covers and small water volume remaining to support the fish.

4.011 Impacts of Using Agricultural Lands for Dredged Material Disposal - Many small furbearers and upland game birds use agricultural lands as sources of food and shelter. These lands are very valuable wintering habitat if they are not plowed in the fall after harvest. If they are "fall-plowed," their habitat value is limited. Use of such areas for dredged material disposal greatly reduces all habitat values of the land. As a general rule, these lands cannot be used for agriculture again if sand is deposited there. Fine sediments usually can support agriculture, however.

4.012 Impacts of Dredged Material Disposal or Erosion from Disposal Sites on Wing Dams and Riprap - Submerged riprap and wing dams provide excellent fish habitat. The rock substrate provides niches for numerous aquatic insects and other invertebrates. Forage fishes are attracted to the area to feed on the invertebrates and predator fish are attracted to feed on the forage fishes. Dredged material placed on or eroded into these substrates buries the invertebrates and eliminates the feeding areas.

4.013 Impact of Dredged Material Disposal or Erosion on Side Channels - Side channels are valuable as fish habitat and are conduits for freshwater flow to backwater habitats which are very valuable to both fish and wildlife. Many fishes use the channels as year-round living areas, finding both food and shelter in the vegetation and debris commonly present. The generally gentle water flow provides a supply of oxygen but does not require the fish to expend much energy to maintain their position. Side channels also supply ready access to both the main channel and the backwaters when conditions require such movement. Dredged material disposal and erosion of disposal sites on these areas can reduce the habitat values of large areas by simply blocking a small portion of the side channel. If the majority of the side channel escapes burial, the loss of water flow can render the remainder of the habitat much less valuable to fish and wildlife.

4.014 Impact of Using Shoreline Areas for Dredged Material Disposal - Shoreline areas along the main channel are valuable to both fish and wildlife for several life functions. Songbirds and waterfowl use these areas to feed on aquatic insects, plants, and clams which thrive in these areas. Fish feed on these same organisms and spawn in the shallows during the spring. If the shore is riprapped, the area is especially valuable to fish for feeding due to the stable area for aquatic invertebrates to colonize. If the shore area is a sandbar, the value to fish and wildlife would not be so great due to the unstable nature of the bottom for aquatic insects or flora. Dredged material placed on such shore areas reduces the habitat values existing there to lower value sandbar habitat.

#### Water Quality

4.015 The water quality impacts of channel maintenance operations can vary considerably. The primary factors with the greatest influence upon the magnitude and severity of water quality impacts are the type (particle size) or sediments, the degree of contamination, the oxidation state of the sediments, the flow in the river, the type of dredging equipment, and the disposal practices.

4.016 The water quality impacts of the dredging itself are generally related to the resuspension of sediments. Sediment resuspension may increase turbidity, reduce light penetration for photosynthetic activity, interfere with filter-feeding aquatic organisms, and, most importantly, provide for the potential and actual releases of contaminants back into the water column. This last point is the subject of the most concern and debate concerning the water quality effects of dredging. The Water Quality Work Group Appendix summarizes the extent of existing knowledge of the effects of dredging on water quality, with special reference to the Upper Mississippi River.

4.017 Dredged material disposal operations can have extremely varied impacts on water quality. This high variability is a function of many factors that are usually dredging-job-specific. Factors such as sediment type and quantity, method of dredging, disposal site characteristics, volume of material dredged, and ambient river water quality all vary with each dredging job, and all can influence greatly the water quality impacts of any one dredged material disposal action.

4.018 In 1977, Congress passed the Clean Water Act. Section 401 of that statute requires that Federal agencies comply with State requirements for the disposal of dredged material. This requirement has had a significant impact upon the way that dredged material disposal operations are conducted with regard to water quality.

4.019 Excluding emergency situations, the dredged material disposal methods currently practiced by the Corps are limited by state water quality requirements. Each State in the GREAT I study area has somewhat different water quality requirements. However, with a few exceptions, the following disposal methods are those to which the Corps is generally restricted:

1. Mechanical Dredging - This method involves barging the dredged material to a land disposal site and direct unloading of the dredged material onto the land. In-water rehandling at the disposal site is generally not allowed although it may be if no alternative is available.

2. Hydraulic Dredging - The material is pumped directly into a contained disposal area. In-water rehandling is generally not allowed although it may be if no other alternative is available.

These two methods are currently employed in the vast majority of dredging jobs.

4.020 Direct on-land disposal of mechanically dredged materials has little or no water quality impacts. Occasionally, the material must be rehandled in the water adjacent to the site due to poor access or equipment limitations. This practice is only used when the material is sand or coarser material and is uncontaminated. During the rehandling process, increases in turbidity and suspended solids occur. Generally, once the operation ceases, conditions soon return to ambient, with no long-lasting or serious effects on water quality.

4.021 Disposal of hydraulically dredged materials has no water quality impact if the containment site is sufficiently large to contain completely the dredged slurry. If there is an effluent and if it meets State effluent standards, there should be no adverse effects. In those instances where State effluent standards are not met, the impacts can only be evaluated on a case-by-case basis because of the variability in situations. This area needs considerable additional study.

#### Floodplain

4.022 The following is a general discussion of the impacts of dredged material disposal on the floodplain and flood flows.

4.023 Dredged material disposal from channel maintenance operations results either in no impacts upon the floodplain or adverse impacts, dependent upon site location. As a general rule, disposal in the floodplain does not have any beneficial impacts as far as the floodplain and flood flows are concerned.

4.024 Disposal sites that are located out of the 1-percent chance (100-year) floodplain of the Mississippi River and tributary streams would have no impacts on floodplain management programs or on the flood-flow carrying capacity of the river. Sites located on floodplain islands that are above the 1-percent flow stage are still considered to be in the floodplain. (For a definition of the 1-percent chance flood see the Floodplain Management Work Group Appendix.)

4.025 If dredged material is placed in the floodplain, it is in either the effective flow area or the flood fringe. If the material is in the effective flow area of the floodplain, it has a potential for adverse impacts on the river's capacity for conducting floodwater downstream. The effective flow area, which in some cases is the same as the floodway, is that part of the floodplain where water is actually moving downstream during a flood. If a sufficient volume of dredged material is placed in the path of the water, it can cause the water to back up and raise the upstream floodwater stage, or elevation. Any increase in flood stage can potentially cause an increase in property damage and risk to life. The magnitude of the stage increase can only be determined by a series of complex calculations that are usually done by computer. The cumulative effects of all dredged material in a given reach of river must be determined, not in just one site by itself.

4.026 If the material is in the flood fringe, the floodwater storage capacity of the floodplain is reduced. When floodwaters are rising, some water flows laterally into backwater areas of the floodplain. As floodwaters recede, this fringe area drains and the water flows downstream. If the storage capacity of the flood fringe is reduced by filling with dredged material, the water that would otherwise fill that area is displaced and flows downstream. Thus, the downstream discharge is greater and the flood stage is higher. Again, there are the adverse impacts associated with higher flood stages. As with material in the effective flow area, the magnitude of the effects must be calculated by considering the cumulative volume displaced by all sites in a given reach.

4.027 Another adverse effect of dredged material placement results from providing fill to landowners along the river. Frequently, the fill is used to provide a base for construction in the floodplain, a practice that is discouraged in floodplain management. The Corps of Engineers, the suppliers of the material, do not consider local floodplain ordinance restrictions applicable to channel maintenance operations. Consequently, fill is provided from dredging that would otherwise not be permitted.

#### Recreation

4.028 Dredged material from channel maintenance dredging has created many sand beaches along the main channel of the river. Because of their proximity to navigable water, the beaches are heavily utilized free of charge for swimming

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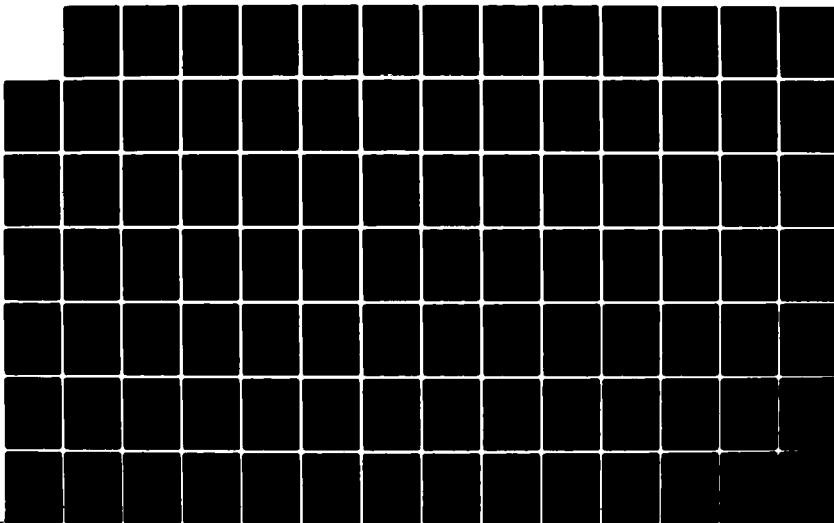
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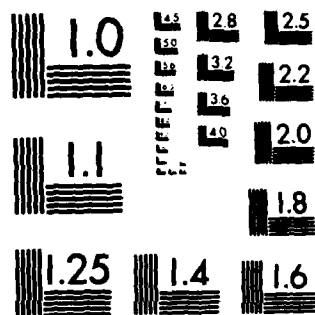
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picnicking, waterskiing, camping and "partying." These areas are essentially undeveloped and unmanaged. Almost 88 percent of a sample of dredge spoil island users, surveyed in a 1977 study conducted by the University of Wisconsin under contract with the Recreation Work Group (RWG), indicated that they enjoyed using dredge disposal sites and would like to see more islands created. It is estimated that approximately 352,000 people visited dredged material disposal areas in 1977.

4.029 Sandbars of various sizes have historically been common along the Mississippi River, as a result of natural accretion, water level fluctuations, and navigation channel maintenance activities. The river users generally accept some sandbars as a part of the "river-scape," and sandbars are one of the major attractions to the boating recreationists.

4.030 Not all dredged material disposal areas are used by recreationists, however. Large inland sites, sites with steep slopes, and those that sharply contrast with the "natural" surroundings with excessive height (greater than 15 feet) are not acceptable to river users.

4.031 Due to revegetation, very few disposal sites formed before 1960 are used for recreation unless they have been periodically used for disposal and the exposed sand areas maintained. Sites that have completely revegetated receive little or no recreation use by campers, boaters, swimmers, etc.

4.032 In order to minimize the impacts of dredged material disposal, the Recreation Work Group undertook two major activities: (1) developing criteria and evaluating recommended disposal sites; and (2) developing guidelines to maintain and enhance recreation areas with dredged material. For any recommended disposal site to have potential recreation benefits, it must meet the minimum standards established by the RWG.

4.033 In order to implement any of the RWG dredged material site recommendations for beach nourishment or establishing new recreation areas, it would be necessary for the Corps to obtain new legislative authority and funding allocations.

4.034 All sites identified in the following discussions as having recreation potential are assumed to be used in such manner as to conform to RWG disposal site recommendations.

4.035 St. Croix River - Proposed Dredged Material Disposal Sites - The Lower St. Croix River, from the dam at Taylors Falls, Minnesota, flows in a southerly direction for approximately 52 river miles. This free-flowing river offers unique scenic, recreational and geologic values to the Twin Cities area and the midwest in general. Bluffs are a distinctive feature along the entire river, with the upper segment being relatively shallow, inclosed, narrow, and slough- or island-studded.

4.036 In recognition of these unique qualities and because of the limited human intrusions, Congress designated the Lower St. Croix River as a National Wild and Scenic River Segment via P.L. 92-560 in October 1972 (P.L. 92-560 amended P.L. 90-542). The Lower St. Croix River is jointly administered by the National Park Service and the Departments of Natural Resources of Minnesota and Wisconsin.

4.037 Recent studies conducted by the University of Wisconsin (Lower St. Croix Riverway: User and Resource Conditions, 1978) have documented that the riverway is under stress, with various user types being displaced to other resources and some evidence of resource deterioration caused by overcrowding. Management agencies have recently undertaken various measures to attempt to limit increased user pressure.

4.038 Heaviest use occurs in those portions of the river having available sandy beaching areas. These sites have occasionally attracted users to the point where 3-4 tiers of boats have been photographed tiering up adjacent to these beaches. The addition of new disposal sites would have a tremendous impact on the amount, type, and distribution of river recreation use. Detailed environmental assessments would be necessary to identify these impacts prior to the placement of any dredged material in sites having potential recreation uses.

4.039 Upper Mississippi River - Proposed Dredged Material Disposal Sites - The Upper Mississippi River is unique in that its physical attributes make possible a wide range of recreational experiences within each pool or segment of a pool. The provision of dredged material on both existing and new disposal sites offers opportunities for a variety of recreational experiences along and on the river. The most popular of these activities are beach camping, swimming, and picnicking. For evaluating the overall public need for additional material placement, the RWG recreation resource needs assessment provided some guidance for establishing priorities. On an overall rating of resource deficiencies, Pool 3 has the greatest need. Pool 3 also has the highest deficiency for additional picnicking units, while most other pools have adequate resources. Swimming facilities are mostly needed in Pools 5, 5A, 7, and 9. Although Pools 1 and 2 potentially have the greatest pressure for beach development, water quality problems and heavy industrialization greatly limit their public use. Pools 3 and 9 also have the greatest need for additional camping facilities.

4.040 The use of dredged material to provide boat beaching areas (that could serve as waiting areas for recreational craft wanting to use navigational locks) should help alleviate safety problems related to queuing activities. Navigational lock capacity studies have indicated that Locks 1 and 2, and to some extent Lock 3, will come under the greatest pressure in the future from both future commercial and recreational river craft users. The relationship between dredged material placement and recreation craft use will need to be carefully defined within future assessments, especially within these three pools.

4.041 Other related recreation resource concerns that should be emphasized within future site-specific environmental assessments include:

1. Economic impact to riverside communities when and if existing dredged material disposal sites currently receiving substantial use are no longer maintained.

2. Expected shifts in river-recreation user patterns and its resulting resource impacts when previously used sites are not maintained or are reshaped and/or modified with shoreline protection or containment structures.

#### Commerce and Transportation

4.042 Maintenance of the 9-foot navigation channel is for the specific purpose of providing for expanded commercial traffic. Thus, as a general rule, dredging and disposal to the extent necessary to keep the channel open to safe navigation have a beneficial impact upon commercial transportation.

4.043 Disposal of dredged material generally has no physical impact upon commercial transportation as the disposal sites are placed such that they would not interfere with barge traffic. In this light, the alternative disposal sites considered for the various channel maintenance would have no adverse impact and would in all cases work towards benefiting commercial transportation by facilitating maintenance of the channel.

4.044 From an economic and political viewpoint, the more costly a disposal site, the less favorable it is to commercial transportation interests. As channel maintenance costs rise, the potential for increasing or instituting new user fees to offset these costs increases. While commercial waterway transportation interests could pass any increased costs from user fees on to their customers, there would be a reduction in their competitive edge over land transportation modes.

4.045 Also, each year the Corps works with a finite channel maintenance budget. Increased maintenance costs at any particular site reduce the money available for maintaining the remainder of the system. This, in turn, could result in less efficient maintenance and increased potential for groundings during peak dredging years.

4.046 Therefore, any channel maintenance plans that raise maintenance costs would be considered unfavorable to commercial transportation interests; i.e., the EQ plan sites. Conversely, the less costly sites (NED) would be more favorable to commercial transportation interests.

#### Cultural Resources

4.047 Cultural resources are defined as sites, structures, objects, or buildings which have prehistoric or historic significance because of their innate uniqueness, research value, or association with important individuals or groups. Cultural resources are a nonrenewable resource. Once an archaeological site is severely disturbed or a historic building is structurally altered (as opposed to "renovated"), the historic integrity of the item is lost.

4.048 Dredging, by itself, usually has little or no effect on cultural resources on land, except during the construction of fleeting areas for barges. It can be highly destructive to underwater sites, however, particularly to inundated archaeological sites and boatwrecks. Moreover, the disposal of dredged material on land can be destructive to cultural resources in a number of ways. Disposal areas are cleared of structures and buildings (even moving a building intact can result in a loss of "integrity"), and placement of material obscures sites which remain undiscovered and unrecorded. Artifacts in archaeological sites can be destroyed by the compaction of earth under disposal piles. The removal of disposal material from an area can result in the total destruction of an archaeological site which may have been obscured by the initial placement. The use of dredged material to establish public beaches on riverbanks and islands has an indirect adverse effect on cultural resources. Increased public use of an area means more exposure of sites and buildings which may be nearby. This often results in vandalism, artifact collecting, and other forms of small-scale destruction.

#### Social Environment

4.049 Individuals, communities, commerce, and government compose the social environment. The interrelated activities of citizens' interests, their jobs in business and government, and their family and personal activities in their communities all create a dynamic social framework that changes with their needs.

4.050 Changing the physical environment can have both direct and indirect social impacts. Social behavior, attitudes, community groups, businesses, and local government can all be affected by changes related to channel maintenance. River-related projects can temporarily increase populations for employment, increase needs for health care and community services, and remove families from floodplain areas.

4.051 Maintenance dredging of the 9-foot navigation channel does not necessarily involve the types of changes described above. Instead, the short-term social impacts of dredging are usually limited to reduced aesthetic values and short-term water quality degradation problems. The impacts of dredged material disposal have long-term social impacts, however.

4.052 By law, the Corps of Engineers is responsible for maintaining the navigation channel. Thus, under all of the alternative channel plans, maintenance dredging would continue, albeit with some variations in equipment. The channel maintenance plans differ primarily in their designation of dredged material disposal sites.

4.053 Channel maintenance operations have negative impacts upon both individuals and institutions, including impacts on individual health, aesthetic values, and recreational expectations. In some instances (especially in Pools 1 and 2), dredging can make the water unsafe for body contact activities. Aesthetic values are affected by the disposal sites because disposal alters the shape of riparian areas - a matter of concern for those who prefer preservation of the natural wilderness.

4.054 Recreational expectations generally involve the desire for an accessible, clean river that provides aesthetic as well as outdoor activity enjoyment. These broad social effects are the concern of all levels of government and private organizations that represent public concerns. This concern has resulted in legal and community efforts to promote change in current channel maintenance practices.

4.055 Dredged material disposal has its greatest impacts on land uses. Disposal of dredged material usually provides only minor social benefits. Negative impacts include loss of farmland, aesthetic degradation, and the potential for beaching of contaminants onto adjacent lands.

4.056 Disposal of material can have adverse and beneficial social impacts in urban areas. Its benefits can include converting lands into residential or commercial/industrial areas, as well as providing urban development uses such as fill for scarred areas and for street and highway uses. Adverse impacts include the potential for creating inequitable competition with privately owned sand and gravel companies by giving away dredged sand.

4.057 Impacts upon individuals vary and at times have opposite effects on different people. Certain individuals appreciate sandy beaches along the river while others prefer densely vegetated areas. Some find dredging and disposal operations noisy, aesthetically displeasing, and restrictive for their activities, while others are not affected by these operations.

4.058 Disposal of dredged material can have beneficial recreational benefits such as creation of parks and primitive island camping areas. Park development requires maintenance which can be an economic burden on local managing authorities. Recreation development is generally beneficial but no clear information is available on what constitutes overdevelopment.

### Pool-Specific Impacts

4.059 The following pages contain the impact evaluations for the alternative disposal sites considered in the final development of the Dredged Material Placement Plan (DMPP). In essence, these are the impacts upon which the GREAT I team based their decisions in selecting the recommended sites in the DMPP. Because of the number of different sites involved, these site-specific impacts are outlined in tabular form (Table 4) to make this section easier to use.

4.060 The impacts that were considered in the decision-making process were, for the most part, long-term impacts or general short-term impacts. Specific short-term impacts that would occur only during a particular dredging job are impossible to predict over a 40-year period.

4.061 The types of impacts that were considered in the decision-making processes were as follows:

- a. Loss of fish and wildlife from use of the total site.
- b. Potential impacts from erosion of the sites.
- c. Generic water quality impacts.
- d. Generic floodplain impacts.
- e. Impacts on river recreation values.
- f. Cultural resource impacts at some sites; potential cultural resource impacts at most sites.
- g. General social impacts.
- h. General beneficial uses of and demands for the dredged material.
- i. Point of excessive economical costs of site use.
- j. Costs for the recommended sites.

4.062 The types of impacts that are generally unknown at this time and that were not considered in the decision-making process are listed below:

- a. Fish and-wildlife habitat impacts at the sites by dredging job.
- b. Specific water quality impacts by dredging job.
- c. Specific floodplain impacts by dredging job.
- d. Recreation impacts on non-river recreationists.
- e. Cultural resource impacts at most sites.

- f. Specific social impacts by dredging job.
- g. Specific locations and uses of the dredged material for beneficial use.
- h. Costs of using non-recommended alternative sites.
- i. Actual cost by dredging job.

4.063 The types of impacts listed above are those that the Corps, in consultation with the affected States and Federal agencies, will have to address at the time of dredging. Section 6.000, pages 203-216 discuss the further environmental documents that need to be prepared on the dredged material placement sites.

4.064 Following the discussions of sites for each pool is a brief summary of the site selection rationale. A more detailed discussion of the site selection process and rationale can be found in the Channel Maintenance Appendix.

TABLE 4  
IMPACTS OF ALTERNATIVE DISPOSAL SITES

Table 4.1

UPPER ST. ANTHONY FALLS POOL

<u>Cut</u>	<u>Primary Alternatives</u>
1. Above and Below Broadway/Plymouth Ave. Bridge	U.01; U.02; U.03
2. Above and Below Lowry Ave. Bridge	U.01; U.02; U.03
3. Below Soo Line RR Bridge	U.01; U.02; U.03

Impacts of Site Use

U.01 (NED)

- a. Little or no impacts on fish and wildlife.
- b. No water quality impacts.
- c. Potential floodplain impacts if material is not removed prior to seasonal high water.
- d. No recreation impacts.
- e. Very low potential for cultural resource impacts.
- f. City of Minneapolis proposes this site for future development.
- g. Material used for beneficial use.\*

U.02 (EQ)-Selected Site for Cuts 1-3

- a. Little or no impacts on fish and wildlife.
- b. No water quality impacts.
- c. Potential floodplain impacts if the material is not removed prior to seasonal high water.
- d. No recreation impacts.
- e. Low potential for cultural resources impact; the site would require a survey before use.
- f. No appreciable social impacts.
- g. Material used for beneficial use.

U.03 - Secondary Site for Cuts 1-3

- a. Little or no impacts upon fish and wildlife.
- b. No water quality impacts.
- c. No floodplain impacts.
- d. No recreation impacts.
- e. Very low potential for cultural resource impacts.
- f. No appreciable social impacts.
- g. Material used for beneficial use.

\* A detailed discussion of beneficial uses can be found in the Dredged Material Work Group Appendix for this pool and all others.



Summary of Site Selection - Upper St. Anthony Falls Pool

4.065 The City of Minneapolis is responsible for providing disposal sites for dredging in Upper St. Anthony Falls Pool. Site U.01 is the historic disposal site for this pool. However, the city proposes to develop this site. The remaining two sites considered were U.02, an industrial site proposed by the city, and U.03, a privately owned sand and gravel stockpile site. Both sites are considered acceptable by GREAT I for disposal. Site U.02 is recommended as the preferred site, subject to the condition that the material be removed before seasonal high water, because it is the site recommended by the City of Minneapolis and because the material would be put to beneficial use by public agencies.

TABLE 4.2

## POOL 2.

<u>Cut</u>	<u>Primary Alternatives</u>
1. Upper Approach to Locks and Dam (L/D) 1	1.01, 1.10
2. Below St. Paul Daymark	1.01, 1.10
3. Below Lake St. Bridge	1.01, 1.10
4. Above Lake St. Bridge	1.01, 1.10
5. Below Franklin Ave. Bridge	1.01, 1.10
6. Above Franklin Ave. Bridge	1.01, 1.10
7. Below Lower St. Anthony Falls	1.01, 1.10

Impacts of Site Use1.01 (EQ, NED) - Selected Site for Cuts 1-7

- a. Little or no impacts on fish and wildlife.
- b. No water quality impacts.
- c. Potential for adverse floodplain impacts if the material is not removed before seasonal high water.
- d. No recreational impacts.
- e. Cultural resource survey required before use.
- f. No appreciable social impacts.
- g. Material removed for beneficial use.

1.10

- a. Construction of an island at this site would render the main channel in this area unsuitable for wintering fish.
- b. Assuming the use of only uncontaminated material, State standards for turbidity and suspended solids would be violated during disposal operations.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts by providing a site for boat beaching, camping, picnicking, and swimming.
- e. No cultural resource impacts.
- f. Safety benefit by providing a lockage waiting area for small craft.

1.02 - Recommended as Suitable for Temporary Disposal for Cut 1

- a. Little or no fish and wildlife impacts.
- b. Negligible water quality impacts.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from maintaining an open sandy area adjacent to the river.
- e. Low potential for cultural resource impact; survey required before use.
- f. Adverse social impacts as site attracts recreational use creating a localized traffic hazard.
- g. Material available for beneficial use.

1.03 - Recommended as Suitable for Temporary Disposal for Cuts 3 and 4

- a. Little or no fish and wildlife impacts.
- b. Negligible water quality impacts.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from maintenance of an open sandy area adjacent to the river.
- e. Low potential for cultural resource impact; survey required before use.
- f. Adverse social impacts because site may attract recreational uses that would be objectionable to adjacent residents, such as dirt-bike use and late night parties.
- g. Material available for beneficial use.

1.07 - Recommended as Suitable for Temporary Disposal for Cut 5

- a. Little or no fish and wildlife impact.
- b. Negligible water quality impacts.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from maintaining an open sandy area adjacent to the river.
- e. Low potential for cultural resource impact, survey required before use.
- f. No appreciable social impacts.
- g. Material available for beneficial use.

Summary of Site Selection - Pool 1

4.066 Site 1.01 has been the site historically used for much of past disposal in Pool 1. It was selected because it has the capacity to handle all of the material from Pool 1 and the impacts of using this site are negligible.

TABLE 4.3

## MINNESOTA RIVER

<u>Cut</u>	<u>Primary Alternatives</u>
1. Mouth	M.27; 2.18
2. Four Mile	M.25; M.27; M.28
3. Peterson's Bar	M.06; M.30
4. Cargill	M.03
5. Sewage Bridge	M.03; M.26

Impacts of Site UseM.27 (EQ, NED)

- a. Loss of 19 acres of bottomland hardwoods. Failure of erosion control would impact upon additional bottomland hardwood habitat and fishery habitat.
- b. Site configuration would make it difficult to meet State effluent standards if hydraulic dredging were used.
- c. Potential adverse floodplain impacts.
- d. No recreation impacts.
- e. Cultural resource survey required before use.
- f. No appreciable social impacts.

2.18 (EQ)- Selected Site for Cut 1

- a. No fish and wildlife impacts.
- b. No water quality impacts.
- c. No floodplain impacts.
- d. No recreation impacts.
- e. Very low potential for cultural resource impacts; should be surveyed before use.
- f. No appreciable social impacts.
- g. Material used for beneficial use.

M.25 (NED)

- a. Little impact upon wildlife habitat. Failure of erosion control would have impacts on bottomland hardwood habitat and fishery habitat.
- b. Size and location of site would make it difficult to meet State effluent standards for turbidity and suspended solids if hydraulic dredging were used.
- c. Adverse floodplain impacts.
- d. Potential recreation benefits from use of the site by river recreationists. Conflicts with Fort Snelling State Park plans.
- e. Cultural resource survey required before use.
- f. No appreciable social impacts.

M.28 - Selected Site for Cut 2

- a. Loss of 18 acres of upland meadow habitat. Failure of erosion control would impact upon bottomland hardwood habitat.
- b. Minor water quality impacts.
- c. Adverse floodplain impacts.
- d. Potential recreation benefits from use of the site by river recreationists.
- e. Cultural resource survey required before use.
- f. No appreciable social impacts.

M.06 (NED) - Secondary Site for Cut 3

- a. Minor fish and wildlife impacts.
- b. No appreciable water quality impacts.
- c. Potential adverse floodplain impacts.
- d. No recreation impacts.
- e. Cultural resource survey required before use.
- f. No appreciable social impacts.

M.30 (EQ) - Selected Site for Cut 3

- a. No fish and wildlife impacts.
- b. No appreciable water quality impacts.
- c. No floodplain impacts.
- d. No recreation impacts.
- e. No cultural resource impacts.
- f. No appreciable social impacts.

M.03 (EQ, NED) - Selected Site for Cuts 4-5

- a. Loss of 7 acres Type 1-2 wet meadow.
- b. No appreciable water quality impacts.
- c. No floodplain impacts.
- d. No recreation impacts.
- e. Cultural resource survey required before use.
- f. No appreciable social impacts.
- g. Material available for beneficial use.

M.26 (NED)

- a. Loss of 3 acres meadow and shrub habitat. Failure of erosion control would impact upon fishery habitat.
- b. Size and location of site would make it impossible to meet State effluent standards if hydraulic dredging is used.
- c. Adverse floodplain impacts.
- d. No recreation impacts.
- e. Cultural resource survey required before use.
- f. No appreciable social impacts.

Summary of Site Selection - Minnesota River

4.067 For Cut 1, site 2.18 was selected over M.27 because of lesser impacts and because the material would be readily used for beneficial use at 2.18.

4.068 Cut 2 has been dredged only once historically and the GREAT I team believes it may never be dredged again. Site M.28 was selected because it was used in the past for this cut, is readily accessible from the cut, and its use would have impacts comparable to or less than those at the two primary alternatives M.25 and M.27.

4.069 For Cut 3, site M.30 was selected over M.06 because of lesser impacts. Site M.06 is considerable acceptable by GREAT I and is recommended as a secondary site should the use of site M.30 be unavailable.

4.070 Site M.03 was selected for Cuts 4 and 5 because of only minor impacts at the site, accessibility, and capacity for both cuts.

TABLE 4.4

## POOL 2

<u>Cut</u>	<u>Primary Alternatives</u>
1. Upper Approach to L/D 2	2.30
2. Boulanger Bend Lower Light	2.24; 2.35
3. Boulanger Bend	2.24; 2.35
4. Pine Bend Foot Light	2.10; 2.24; 2.25
5. Grey Cloud Slough	2.05; 2.10
6. Below Cudahy	2.05; 2.10
7. St. Paul Barge Terminal	2.02; 2.13; 2.14; 2.15; 2.40
8. Harriet Island	2.16
9. Above and Below Smith Ave. Bridge	2.16; 2.37
10. Lower Approach to L/D 1	2.18

Impacts of Site Use2.30 (EQ, NED) - Selected Site for Cut 1

- a. Disturbance of 3.5 acres Type 1 bottomland hardwoods.
- b. Water quality impacts expected to be temporary and minor. Size of site would make it unlikely State effluent standards could be met.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from creation of sandy riparian area.
- e. Cultural resource survey required before use.
- f. Social benefit through improved safety from use of the site as a lockage waiting area.

2.35 (EQ, NED) - Selected Site for Cuts 2-3

- a. Loss of 25 acres of crop and grazing land habitat.
- b. No appreciable water quality impacts.
- c. No adverse floodplain impacts.
- d. No recreation enhancement.
- e. Cultural resource survey required before use.
- f. Loss of agricultural productivity.
- g. Material available for beneficial use.

2.24 (NED)

- a. Disturbance of 15 acres of Type 1 bottomland hardwoods. Failure of erosion control would impact on downstream wetlands and aquatic habitat.
- b. Considerable water quality impacts probable. Size of site would make it unlikely State effluent standards could be met.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts.
- e. Cultural resource survey required before use.
- f. No appreciable social impacts.

#### 2.25 (NED)

- a. Disturbance of 9 acres of Type 1 bottomland hardwoods. Failure of erosion control would impact on downstream wetlands and aquatic habitat.
- b. Considerable water quality impacts probable. Size of site would make it unlikely that State effluent standards could be met.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts.
- e. Cultural resource survey required before use.
- f. No appreciable social impacts.

#### 2.10 (EQ) - Selected Site for Cuts 4-6

- a. Loss of 25 acres of a revegetated manure disposal pit of low wildlife value.
- b. No water quality impacts.
- c. No floodplain impacts.
- d. No recreation impacts.
- e. No cultural resource impacts.
- f. No appreciable social impacts.
- g. Material available for beneficial use.

#### 2.05 (NED)

- a. Disturbance of 43 acres of upland meadow interspersed with Type 1-2 wet meadow habitat.
- b. No appreciable water quality impacts.
- c. Potential adverse floodplain impacts.
- d. No recreational impacts.
- e. Cultural resource survey required before use.
- f. No appreciable social impacts.
- g. Material available for beneficial use.

#### 2.02 (EQ) - Tertiary Site for Cut 7

- a. Disturbance of 69 acres of disturbed upland meadow habitat.
- b. No appreciable water quality impacts.
- c. No floodplain impacts.
- d. No recreation impacts.
- e. Cultural resource survey required before use.
- f. No appreciable social impacts.
- g. Material available for beneficial use.

#### 2.13 (NED) - Tertiary Site for Cut 7

- a. Disturb 18 acres of previously disturbed Type 1 bottomland hardwoods. Failure of erosion control would impact upon adjacent Type 3-4 wetlands.
- b. Substantial water quality impacts probable. Size of site would make it unlikely State effluent standards could be met.



- c. Potential adverse floodplain impacts.
- d. No recreation impacts.
- e. Cultural resource survey required before use.
- f. No appreciable social impacts.
- g. Material available for beneficial use.

2.14 (NED) - Selected Site for Cut 7

- a. Loss of 110 acres of wetlands; primarily Type 1-2 wet meadows with approximately 30 acres of Type 3-4 shallow and deepwater marshes.
- b. No appreciable water quality impacts.
- c. Adverse floodplain impacts.
- d. No recreation impacts.
- e. Cultural resources survey required before use.
- f. Socio-economic benefits would accrue from expansion of the Holman Field airport.

2.15 (NED) - Secondary Site for Cut 7

- a. No fish and wildlife impacts.
- b. Size of site would make it nearly impossible to meet State effluent standards. Potential for substantial water quality impact.
- c. No floodplain impact.
- d. No recreation impacts.
- e. No cultural resource impacts.
- f. No appreciable social impacts.
- g. Material available for beneficial use.

2.40 - Tertiary Site for Cut 7

- a. Loss of marginal aquatic habitat.
- b. Size potential of the site would make it very difficult to meet State effluent standards. Potential for substantial water quality impact.
- c. Potential adverse floodplain impacts.
- d. No recreation impacts.
- e. No cultural resource impacts.
- f. Long-range potential for industrial development.

2.16 (EQ, NED) - Selected Site for Cut 8

- a. No appreciable impact upon fish and wildlife.
- b. No appreciable water quality impacts.
- c. Potential floodplain impact if material is not removed prior to seasonal high water.
- d. No recreational impacts.
- e. No cultural resource impact.
- f. No appreciable social impact.
- g. Material removed for beneficial use.

2.37 (EQ, NED) - Selected Site for Cut 9

- a. No appreciable fish and wildlife impacts.
- b. Water quality impacts expected to be temporary and minor. Size of site would make it impossible to meet State effluent standards.
- c. Potential floodplain impact.
- d. No recreational impact.
- e. Cultural resource survey should be conducted prior to use.
- f. No appreciable social impact.
- g. Material available for beneficial use.

2.18 (EQ, NED) - Selected Site for Cut 10

- a. No fish and wildlife impacts.
- b. No water quality impacts.
- c. No floodplain impacts.
- d. No recreation impacts.
- e. Should be surveyed for cultural resources prior to use.
- f. No appreciable social impacts.
- g. Material used for beneficial use.

Summary of Site Selection - Pool 2

4.071 Site 2.30 was selected for Cut 1 because of ease of access and the recreational and safety benefits from eventual use of this area as a lockage waiting area.

4.072 Site 2.35 was selected for Cuts 2 and 3 because of lesser impacts than at site 2.24 and the ease of diking at this site to meet water quality regulations.

4.073 Site 2.10 was selected for Cuts 4, 5, and 6 because of lesser impacts than at 2.05 and 2.10, ease of diking at the site, and a known demand for the material by Dakota County.

4.074 Selection of a site for Cut 7 was difficult because this area of St. Paul is developmentally volatile. Finding a long-term disposal site with sufficient volume was nearly impossible. Site 2.14 was selected as the primary site for Cut 7 on the condition that the airport expansion project receives approval. If not, site 2.14 would not be used. Site 2.15 is recommended as the secondary site because of historic use and limited impacts. However, site 2.15 has limited capacity and uncertain future availability. Site 2.13 was given next preference because of known availability despite having some impacts associated with its use. Site 2.40 was given lower preference because of unproven feasibility. Site 2.02 was given fifth priority because of very difficult access problems despite having only minor impacts associated with its use.

4.075 Sites 2.16, 2.37, and 2.18 were selected for Cuts 8, 9, and 10 respectively, because use of these sites would have only negligible impacts and the material would be removed for beneficial use.

TABLE 4.5

## ST. CROIX RIVER

<u>Cut</u>	<u>Primary Alternatives</u>
1. Kinnikinnic Bar	SC.12; SC.13; SC.14; SC.15; SC.16; SC.21; SC.26; 2.10; 3.34
2. Catfish Bar	SC.11; SC.21; SC.27; 2.10
3. Hudson	SC.01; SC.03; SC.04; SC.05; SC.06; SC.07; SC.18; SC.22; SC.24; SC.25; SC.28; 2.10

Impacts of Site UseSC.12 - Selected Site for Cut 1

- a. Loss of 17 acres of revegetating disposal site habitat.
- b. Water quality impacts expected to be temporary and minor.
- c. Adverse floodplain impacts.
- d. Beneficial recreational impacts from creation of open sandy areas on the river.
- e. No cultural resource impacts.
- f. Site is in the new Kinnikinnic State Park. Use of the site will have to conform to park management plans.

SC.13 (NED) - Secondary Site for Cut 1

- a. Loss of 9 acres of revegetated disposal site.
- b. Water quality impacts expected to be temporary and minor. Size of site would make it difficult to meet State effluent standards.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from creation of an open sandy area.
- e. No cultural resource impacts.
- f. Site is in the new Kinnikinnic State Park. Use of the site would have to conform to park management plans.

SC.14 (NED)

- a. Minimal wildlife impacts on the island. Loss of aquatic habitat from expansion of the island.
- b. Water quality impacts expected to be temporary and minor.
- c. Adverse floodplain impacts.
- d. No public recreational benefits due to private ownership of island.
- e. No cultural resource impacts.
- f. Adverse public reaction to the development of a private island when public beaches and beaching areas need the sandy material.

SC.15

- a. Loss of 4 acres of aquatic habitat.
- b. Water quality impacts expected to be temporary and minor.
- c. Adverse floodplain impacts.
- d. No public recreation benefits due to private ownership of land created.
- e. No cultural resource impacts.
- f. Adverse public reactions to creation of private lands when public beaches and beaching areas need the sand.

SC.16 (NED) - Tertiary Site for Cut 1

- a. Loss of 2.5 acres of aquatic habitat.
- b. Water quality impacts expected to be temporary and minor. Violation of State turbidity and suspended solids standards during disposal.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from creation of additional public swimming, beaching, and camping area.
- e. No cultural resource impacts.
- f. No appreciable social impacts.

SC.26 - Tertiary Site for Cut 1

- a. Minimal fish and wildlife impacts.
- b. Water quality impacts expected to be temporary and minor. State standards for turbidity and suspended solids would be violated during disposal on a very localized basis.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from maintaining public beach.
- e. No cultural resource impacts.
- f. No appreciable social impacts.

SC.21 (NED) - Selected Site for Cut 2

- a. Minimal fish and wildlife impacts.
- b. Water quality impact expected to be temporary and minor. State standards for turbidity and suspended solids would be violated during disposal on a very localized basis.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from maintaining public beach.
- e. No cultural resource impacts.
- f. No appreciable social impacts.

SC.18 - Tertiary Site for Cut 3

- a. Loss of 4 acres of open water habitat. Erosion impacts on additional aquatic habitat.
- b. Water quality impacts expected to be temporary and minor. State standards for turbidity and suspended solids would be violated during disposal operations.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from creation of an open sandy bar.
- e. No cultural resource impacts.
- f. No appreciable social impacts.

SC.22 - Secondary Site for Cut 3

- a. Fish and wildlife impacts expected to be minimal.
- b. Water quality impacts expected to be temporary and minor.
- c. Potential adverse floodplain impacts.
- d. Potential beneficial recreational impacts from use of the material for beach nourishment and other park improvements.
- e. Low potential for cultural resource impacts; survey required before use.
- f. No appreciable social impacts.
- g. Material available for beneficial use.

SC.24 - Tertiary Site for Cut 3

- a. No fish and wildlife impacts.
- b. No water quality impacts.
- c. No floodplain impacts.
- d. No recreation impacts.
- e. Low potential for cultural resource impact; survey required before use.
- f. No appreciable social impacts.
- g. Material removed for beneficial use.

SC.28 - Tertiary Site for Cut 3

- a. Minimal fish and wildlife impacts on site. Loss of aquatic habitat if the island is enlarged.
- b. Water quality impacts expected to be temporary and minor.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from maintaining the island in an open sandy condition.
- e. No cultural resource impacts.
- f. No appreciable social impacts.

SC.11

- a. No fish and wildlife impacts on site. Potential erosion impacts on aquatic habitat downstream of site.
- b. Water quality impacts expected to be temporary and minor.
- c. Adverse floodplain impacts.
- d. No appreciable recreation impacts.
- e. No cultural resource impacts.
- f. No appreciable social impacts.

SC.27 - Secondary Site for Cut 2

- a. Potential adverse wildlife impacts if material is used in the park to fill in wetlands.
- b. Water quality impacts temporary and minor if the material is used for beach nourishment. No impacts if material is used as fill in the park.
- c. Adverse floodplain impacts if the material is used for beach nourishment.
- d. Beneficial recreation impacts from use of the material to enhance park features.
- e. Potential cultural resource impacts; survey of use areas required.
- f. No appreciable social impacts.

SC.01, .03, .04, .05, .06 - Selected and Tertiary Sites for Cut 3

- a. Disposal on these islands would have minimal wildlife impacts. If the islands are enlarged in size, there would be adverse impacts from loss of additional aquatic habitat.
- b. Water quality impacts expected to be temporary and minor.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from maintaining these islands in an open sandy condition.
- e. No cultural resource impacts.
- f. Maintaining these islands as areas of high recreational use probably has an impact on the character and economy of Hudson, Wisconsin.

SC.07 (EQ)

- a. Loss of 4.5 acres of open water habitat. Purpose would be to convert approximately 25-30 acres of open water habitat into a backwater-like area and improve its value of fish and wildlife habitat.
- b. Water quality impacts expected to be temporary and minor during deposition. Water in the created backwater would become somewhat more stagnant.
- c. Adverse floodplain impacts.
- d. Adverse recreation impacts because the area currently is heavily used for boating, water skiing, and swimming.
- e. No cultural resource impacts.
- f. No appreciable social impacts.

#### Summary of Site Selection - St. Croix River

- 4.076 The Lower St. Croix River is part of the National Wild and Scenic River System. It is managed by the States of Minnesota and Wisconsin and the National Park Service through the Lower St. Croix Management Commission.
- 4.077 The primary factor used by GREAT I in selecting sites on the St. Croix was to use the material to safely enhance the recreational opportunities on the river. Also, the GREAT I team placed heavy weight upon the recommendations of the Lower St. Croix Management Commission.
- 4.078 For Cut 1, five sites are recommended in order of preference. SC.12 is the preferred site as it is immediately adjacent to the dredge cut. SC.13 is also adjacent to the dredge cut but is less preferred than SC.12 because of the higher quality wildlife habitat on it. Sites SC.16 and SC.26 are less preferred than SC.12 and SC.13, because of their distance from the dredge cut. SC.16 is preferred over SC.26 because it would expand beach facilities on the St. Croix River in an area where they are in short supply. Site 3.34 is recommended primarily as a place to put the material should the other sites be unavailable.
- 4.079 SC.21 was selected instead of SC.11 for Cut 2 as it would involve placing the material on a public beach versus a private sandbar. SC.27 is recommended as a secondary site primarily as a site of opportunity (i.e., if the Afton State Park needs the material, it should be provided to them).
- 4.080 For Cut 3, nine sites are recommended in preferential order. The first seven sites are listed in priority of need for dredged material to enhance or maintain recreational opportunities. These are sites SC.01, SC.22, SC.18, SC.03, SC.04, SC.05, and SC.06. The eighth site in preference, SC.28, currently does not need material but may in the future. Also, this site would be available for use if needed. Site SC.24 is identified finally as a place to take the material with minimal impact should none of the recreational enhancement sites be available, an unlikely occurrence.

TABLE 4.6

## POOL 3

<u>Cut</u>	<u>Primary Alternatives</u>
1. Below Diamond Bluff	3.07; 3.09; 3.10; 3.43
2. Coulter's Island	3.09; 3.12;
3. Morgan's Coulee	3.09; 3.14; 3.16
4. Jig River	3.21; 3.27; 3.44
5. 4-mile Island/Truedale Slough	3.27; 3.28; 3.40
6. Pine Coulee	3.27; 3.30
7. Prescott	3.33; 3.34; 3.46
8. Vermillion River	3.46
9. Lower Approach to L/D 2	3.42; 3.46; 3.47; 3.48

Impacts of Site Use3.07

- a. Disturbance of 9 acres of revegetating disposal island and loss of 6 acres of open water habitat. Failure of erosion control would impact on main channel border habitat, including wing dams.
- b. Water quality impacts expected to be minor. State standards for turbidity and suspended solids would be violated during disposal.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from maintaining and enlarging an open sandy island adjacent to the channel.
- e. Low potential for cultural resource impact; survey required before use.
- f. No appreciable social impact.

3.09 (EQ) - Selected Site for Cuts 1-3; Secondary Site for Cuts 4-6

- a. Disturbance of 35 acres of seasonally wet meadow (22 acres) and bottom-land hardwoods (13 acres).
- b. No appreciable water quality impacts.
- c. No floodplain impacts.
- d. No appreciable recreation impacts
- e. Cultural resource survey required before use.
- f. No appreciable social impacts.
- g. Material available for beneficial use.

3.10 (NEP)

- a. Disturbance of 14 acres of riparian habitat including wing dams and riprap. Erosion of material from the site would impact on approximately 2 miles of wing dam and riprap habitat.
- b. Water quality impacts expected to be temporary and minor. Size of the site would make it unlikely that State effluent standards could be met.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from creation of sandy beach-like area.
- e. Cultural resource survey required before use.
- f. No appreciable social impacts.



3.43 (NED) - Secondary Site for Cut 1

- a. Disturbance of 1 acre of bottomland hardwoods and 700 feet of shoreline habitat. Erosion impacts on downstream wetland and aquatic habitat.
- b. Water quality impacts expected to be temporary and minor. State standards for turbidity and suspended solids would be violated.
- c. Potential adverse floodplain impacts.
- d. Beneficial recreation impacts from beach nourishment.
- e. Cultural resource survey required before use.
- f. No appreciable social impacts.

3.12 (NED) - Recommended as Suitable for Temporary Disposal for Cut 2

- a. Disturbance of 6 acres of old dredged material area and 6 acres of bottomland hardwoods. Use of this site would have severe erosion/sedimentation impacts upon fish and wildlife habitat in the backwaters and in the main channel border. Eroding material would damage the habitat value of two wing dams and several acres of Type 3 and 4 wetlands.
- b. Water quality impacts expected to be temporary and minor. Size of site would make it unlikely that State effluent standards could be met.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from creation of additional sandy island area.
- e. Low potential for cultural resources; survey required before use.
- f. No appreciable social impacts.

3.14 (NED) - Recommended as Suitable for Temporary Disposal for Cut 3

- a. Destruction of 2 acres Type 5 deep open slough, 2 acres of Type 3 shallow marsh, 3 acres of Type 1 bottomland hardwoods and disturbance of 3 acres of old disposal site. Failure of erosion control would have severe impacts on downstream wing dams, sloughs, and backwaters.
- b. Water quality impacts expected to be temporary and minor. Size of site would make it difficult to meet State effluent standards.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from creation of sandy shoreline area.
- e. Low cultural resource potential, survey required before use.
- f. No appreciable social impacts.

3.16 (NED)

- a. Loss of 11 acres of Type 1 bottomland hardwoods. Failure of erosion control would impact on wing dams and side channel habitat.
- b. Water quality impacts expected to be temporary and minor; size of site would make it difficult to meet State effluent standards.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from creation of sandy shoreline area.
- e. Low cultural resource potential; survey required before use.
- f. No appreciable social impacts.

3.21 (NED)

- a. Destruction of a 15-acre Type 5 deep open marsh.
- b. No appreciable water quality impacts.
- c. No floodplain impacts.
- d. No appreciable recreation impacts.
- e. No cultural resources impacts.
- f. No appreciable social impacts.
- g. Material available for beneficial use.

3.44 (NED)

- a. Severe disturbance of 1,050 feet of shoreline habitat, including wing dams.
- b. Water quality impacts expected to be minor and temporary; State standards for turbidity and suspended solids would be violated.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from beach nourishment.
- e. Low potential for cultural resources; survey required before use.
- f. Site is under control of Prairie Island Indian Community; use would require consultation with and approval from this community.

3.27 (EQ) - Selected Site for Cuts 4-6

- a. Loss of 31 acres of Type 1 wetlands, approximately one-half bottomland hardwoods, one-half wet meadow. Shoreline disturbance from the need for a rehandling site.
- b. No appreciable water quality impacts at site; potential minor impacts at rehandling site.
- c. Potential adverse floodplain impacts.
- d. No appreciable recreation impacts.
- e. Low cultural resource potential; survey required before use.
- f. No appreciable social impacts.

3.28 (NED)

- a. Loss of 8 acres of Type 1 bottomland hardwoods. Failure of erosion control would result in impacts upon aquatic habitat, particularly wing dams.
- b. Water quality impacts expected to be temporary and minor. Size of site would make it very difficult to meet State effluent standards.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from creation of sandy riparian area.
- e. Low cultural resource potential; survey required before use.
- f. No appreciable social impacts.
- g. Material available for beneficial use.

3.40 (NED)

- a. Loss of 15 acres of bottomland hardwoods. Failure of erosion control would impact on submerged riprap habitat.
- b. Water quality impacts expected to be temporary and minor; size of site would make it difficult to meet State effluent standards.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from creation of sandy riparian area.
- e. Low cultural resource potential; survey required before use.
- f. No appreciable social impacts.

3.30 (NED)

- a. Loss of 9 acres of old disposal site and Type 1 bottomland hardwood. Erosion would impact upon adjacent wetland and aquatic riprap habitat.
- b. Water quality impacts expected to be minor and temporary; size of site would make it unlikely State effluent standards could be met.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from creation of open sandy island and riparian areas.
- e. Low cultural resource potential; survey required before use.
- f. No appreciable social impacts.
- g. Material available for beneficial use.

3.33 (NED)

- a. Loss of 14 acres of Type 1 bottomland hardwood.
- b. Water quality impacts expected to be temporary and minor.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from creation of open sandy area on island.
- e. Low cultural resource potential; survey required before use.
- f. No appreciable social impacts.

3.34 (NED) - Selected Site for Cut 7; Tertiary Site for Cuts 4-6

- a. Loss of 4 acres Type 4-5 deep marsh and 6 acres Type 1 bottomland hardwoods.
- b. Water quality impacts expected to be temporary and minor.
- c. No floodplain impacts.
- d. Potential parking area for Pt. Douglas Beach on Lake St. Croix.
- e. No cultural resource impacts.
- f. No appreciable social impacts.
- g. Material available for beneficial use.

3.46 (EQ, NED) - Selected Site for Cut 8; Secondary Site for Cut 7; Tertiary Site for Cuts 4-6

- a. Disturbance of 11 acres of cropland with negligible fish and wildlife impacts. Failure of erosion control would impact upon aquatic habitat and adjacent bottomland hardwoods.
- b. Water quality impacts expected to be negligible.
- c. Adverse floodplain impacts if material is not removed prior to seasonal high water as proposed.
- d. No recreation impacts.
- e. Low cultural resource potential; survey required prior to use.
- f. No appreciable social impacts.
- g. Material used for beneficial use.

3.42 Tertiary Site for Cut 9

- a. Disposal of 4,000 feet of shoreline habitat. Erosion impacts upon submerged riprap habitat.
- b. Water quality impacts expected to be temporary and minor. State standards for turbidity and suspended solids would be violated.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from beach nourishment.
- e. Low potential for cultural resources; survey required before use.
- f. No appreciable social impacts.

3.47 - Selected Site for Cut 9

- a. No fish and wildlife impacts.
- b. Negligible water quality impacts expected.
- c. No floodplain impacts.
- d. No recreation impacts.
- e. Low potential for cultural resources; survey required before use.
- f. No appreciable social impacts.
- g. Material available for beneficial use.

3.48 - Secondary Site for Cut 9

- a. No fish and wildlife impacts.
- b. Negligible water quality impacts expected.
- c. No floodplain impacts.
- d. Use of material to enhance park features if ever developed.
- e. No cultural resource impacts.
- f. No appreciable social impacts.

Summary of Site Selection - Pool 3

- 4.081 Site 3.09 was selected for Cuts 1, 2, and 3 because it has the volume to contain the material from these three cuts with less impact than any combination of sites 3.07, 3.10, 3.12, 3.14, 3.16, and 3.43. Also, material placed at 3.09 would be readily available for beneficial uses while material placed at the other sites would not be readily available for beneficial uses.
- 4.082 Site 3.27 was selected for Cuts 4, 5, and 6 because it has the volume to contain the material from all three cuts, the impacts of using that site would be less than any combinations of sites 3.21, 3.28, 3.30, 3.40, and 3.44, and the material would be readily available for beneficial uses.
- 4.083 Site 3.34 was selected for Cut 7 despite the adverse wetland impacts at this site. GREAT I believes the beneficial impacts associated with providing additional parking at the Point Douglas Beach offset this loss.
- 4.084 Site 3.46 was selected for Cut 8 because of ease of access, beneficial use of the material, and relatively minor impacts at this site.
- 4.085 Site 3.47 was selected for Cut 9 for basically the same reasons site 3.46 was selected for Cut 8. Lake Rebecca Park was recommended as a secondary site in case park development there ever needs material for fill. Site 3.42 was recommended as a beach nourishment site on the condition that the material is shown to be clean.
- 4.086 Sites 3.09, 3.34, and 3.46 are recommended as secondary and tertiary sites for various cuts to insure the material is taken to an acceptable site should the primary site be unavailable at any time.

TABLE 4.7

## POOL 4

<u>Cut</u>	<u>Primary Alternatives</u>
1. Beef Slough	4.02; 4.04; 4.20; 4.69
2. Grand Encampment	4.02; 4.04; 4.20; 4.69
3. Above Teepeeota	4.02; 4.04; 4.13; 4.20; 4.69
4. Above Crat's Island	4.16; 4.18; 4.19; 4.20; 4.24; 4.25
5. Reads Landing	4.24; 4.25; 4.29
6. Wacouta	4.37; 4.38; 4.39; 4.68; 4.69b
7. Below Red Wing High Bridge	4.47; 4.48; 4.49; 4.54; 4.57
8. Above Red Wing High Bridge	4.54; 4.55; 4.56; 4.57
9. Cannon River	4.52; 4.54; 4.57; 4.58; 4.59
10. Trenton	4.57; 4.60; 4.63
11. Above Trenton	4.57; 4.67

Impacts of Site Use4.02 - Selected Site for Cuts 1-3

- a. Loss of 10 acres of open water habitat along with 900 feet of riprapped shoreline habitat.
- b. Water quality impacts expected to be minor and temporary.
- c. Adverse floodplain impacts.
- d. No recreation impacts.
- e. No cultural resource impacts.
- f. No appreciable social impacts.
- g. Material used for beneficial use.

4.04

- a. Minimal fish and wildlife impact.
- b. Water quality impacts expected to be temporary and minor.
- c. Potential adverse floodplain impacts.
- d. Adverse recreational impacts from conflicts with City of Alma recreational development plans for the site.
- e. No cultural resource impacts.
- f. Adverse social impacts from conflicts with local community plans.
- g. Material removed for beneficial use.

4.69

- a. Loss of 6 acres of open water habitat and 1,500 feet of excellent riprapped shoreline habitat.
- b. Water quality impacts expected to be temporary and minor.
- c. Adverse floodplain impacts.
- d. No recreation impacts.
- e. No cultural resource impacts.
- f. No appreciable social impacts.
- g. Material removed for beneficial use.

4.10 - Recommended as Suitable for Temporary Disposal for Cut 2

- a. No appreciable fish and wildlife impacts on site. Failure of erosion control would impact on main channel border and deepwater marsh habitat.
- b. Water quality impacts expected to be temporary and minor.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from maintaining an open sandy area adjacent to river.
- e. No cultural resource impacts.
- f. No appreciable social impacts.

4.13 (NED) - Recommended as Suitable for Temporary Disposal for Cut 3

- a. No appreciable fish and wildlife impacts if site is not enlarged. Expansion or failure of erosion control would impact on additional Type 3-4 shallow and deep marshes, Type 1 bottomland hardwoods, and main channel border habitat.
- b. Water quality impacts expected to be temporary and minor.
- c. Potential adverse floodplain impacts.
- d. Beneficial recreation impacts from maintaining site in an open sandy condition.
- e. No cultural resource impacts.
- f. No appreciable social impacts.

4.20 (EQ) - Secondary Site for Cuts 1-3; Tertiary Site for Cut 4

- a. Loss of 10 acres of disturbed bottomland hardwood habitat. Failure of erosion control would impact on wing dam habitat.
- b. Water quality impacts are expected to be minor and temporary.
- c. No floodplain impacts.
- d. No recreation impacts.
- e. Moderate potential for cultural resource impacts; survey required before use.
- f. Potential aesthetic and noise impacts upon local residents.
- g. Material available for beneficial use.

4.16 (NED)

- a. No appreciable fish and wildlife impacts if site is not enlarged. Expansion or failure of erosion control measures would impact upon Type 3-4 deep marshes, Type 1 bottomland hardwoods, and main channel border habitat.
- b. Water quality impacts are expected to be temporary and minor.
- c. Potential adverse floodplain impacts.
- d. Beneficial recreation impacts from maintaining site in an open sandy condition.
- e. No cultural resource impacts.
- f. No appreciable social impacts.

4.18 (EQ) - Tertiary Site for Cut 4

- a. No appreciable fish and wildlife impacts.
- b. No water quality impacts.
- c. No floodplain impacts.
- d. No recreation impacts.
- e. No cultural resource impacts.
- f. No appreciable social impacts.
- g. Material available for beneficial use.

4.19 - Tertiary Site for Cut 8

- a. No appreciable fish and wildlife impacts.
- b. No water quality impacts.
- c. No floodplain impacts.
- d. No recreation impacts.
- e. Moderate potential for cultural resource impacts; survey required before use.
- f. No appreciable social impacts.
- g. Material available for beneficial use.

4.25 - Selected Site for Cut 4; Secondary Site for Cut 5

- a. Loss of 18 acres of revegetating sand pit. Pipeline access to site would disturb main channel border and Type 3-4 deep marsh habitat.
- b. No water quality impacts.
- c. No floodplain impacts.
- d. No recreation impacts.
- e. No cultural resource impacts.
- f. No appreciable social impacts.
- g. Material available for beneficial use.

4.24 (EQ) - Selected Site for Cut 5; Secondary Site for Cut 4

- a. Loss of 60 acres of revegetating sand pit. Access to site would disturb bottomland hardwood habitat.
- b. No water quality impacts.
- c. No floodplain impacts.
- d. No recreation impacts.
- e. No cultural resource impacts.
- f. No appreciable social impacts.
- g. Material available for beneficial use.

4.29 (NED) - Recommended as Suitable for Temporary Disposal for Cut 5

- a. No appreciable fish and wildlife impacts if the site is not expanded. Expansion or failure of erosion control measures would impact upon additional Type 3-4 shallow and deep marshes and Type 1 bottomland hardwoods.
- b. Water quality impacts would be temporary and minor.
- c. Potential adverse floodplain impacts.
- d. No appreciable recreation impacts.
- e. No cultural resource impacts.
- f. No appreciable social impacts.



4.37 (EQ) - Selected Site for Cut 6

- a. Loss of 8 acres of revegetated gravel pit.
- b. No water quality impacts.
- c. No floodplain impacts.
- d. No recreation impacts.
- e. Moderate potential for cultural resource impact; survey required before use.
- f. No appreciable social impacts.
- g. Material available for beneficial use.

4.38 - Secondary Site for Cut 6

- a. No appreciable fish and wildlife impacts.
- b. No water quality impacts.
- c. No floodplain impacts.
- d. No recreation impacts.
- e. Moderate cultural resource potential; survey required before use.
- f. No appreciable social impacts.
- g. Material available for beneficial use.

4.39

- a. Loss of 37 acres of bottomland hardwood habitat. Failure of erosion control could result in impacts on shallow water habitat in Lake Pepin.
- b. Potential water quality problems due to contamination in the sediments in the lower portions of the cut.
- c. Adverse floodplain impacts.
- d. No appreciable recreation impacts.

4.68 (NED)

- a. Loss of 21 acres of bottomland hardwoods. Failure of erosion control would result in adverse impacts upon adjacent open water habitat and Type 4 deep marshes.
- b. Potential for adverse water quality impacts. Size of site would make it difficult to meet State effluent standards. Contaminated sediments in lower end of the cut.
- c. Adverse floodplain impacts.
- d. Potential recreation benefits from creation of a sandy peninsula. Handling of contaminated sediments from lower end of the cut would have an influence on the extent of recreational use of the site.
- e. High potential for cultural resource impacts; survey required before use.
- f. No appreciable social impacts.

4.69b

- a. Loss of 20 acres of bottomland hardwoods (Type 1) and 30 acres of Type 3-4 deep marsh. Erosion from site would impact on additional open water and deep marsh habitat.
- b. Potential for adverse water quality impacts. Sediments in the lower end of the cut are contaminated although it is highly unlikely that they would ever be deposited at this site.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from creation of large sandy island.
- e. No cultural resource impacts.
- f. No appreciable social impacts.

4.47(NED) - Secondary Site for Cut 7

- a. Disturbance of 11 acres of bottomland hardwoods.
- b. Water quality impacts expected to be temporary and minor. Size of site would make it difficult to meet State effluent standards.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from expansion of developed areas in Colville Park.
- e. High potential for cultural resource impact; survey required before use.
- f. No appreciable social impacts.

4.48 (NED)

- a. Loss of 11.5 acres of Type 1 bottomland hardwoods and Type 2 wet meadow habitat. Failure of erosion control would impact on main channel border habitat.
- b. Water quality impacts are expected to be minor and temporary. Size of site would make it very difficult to meet State effluent standards.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from creation of sandy shoreline area.
- e. Low cultural resource potential; survey required prior to use.
- f. No appreciable social impacts.
- g. Material available for beneficial use.

4.49 (NED) - Selected Site for Cut 7

- a. Loss of 8 acres of Type 1 bottomland hardwoods. Failure of erosion control would impact on downstream side channels.
- b. Water quality impacts anticipated to be minor and temporary. Size of site would make it highly unlikely State effluent standards could be met.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from creation of sandy island area.
- e. Moderate cultural resource potential; survey required before use.
- f. No appreciable social impacts.

4.54 (EQ, NED) - Tertiary Site for Cut 7

- a. Loss of a disturbed 3-acre Type 1-3 wetland and 5 acres of open field.
- b. No water quality impacts.
- c. Potential adverse floodplain impacts.
- d. No recreation impacts.
- e. Known cultural resources in the immediate area with National Register eligibility potential; survey required before use.
- f. Site is projected for industrial expansion by City of Red Wing.
- g. Material available for beneficial use.

4.57 (EQ) - Selected Site for Cuts 8, 9, & 11; Tertiary Site for Cut 7

- a. No fish and wildlife impacts.
- b. Potential groundwater impact from leaching of land fill material.
- c. Potential adverse floodplain impacts.
- d. No recreation impacts.
- e. Known cultural resources in immediate area with National Register eligibility potential; survey required before use.
- f. Potential for industrial development on this site by City of Red Wing.
- g. Material available for beneficial use.

4.55 (NED)

- a. No appreciable fish and wildlife impacts.
- b. No water quality impacts.
- c. Potential adverse floodplain impacts.
- d. No recreation impacts.
- e. Known cultural resources in immediate area with National Register eligibility potential; survey required before use.
- f. Potential for industrial development on this site by city of Red Wing.

4.56 (NED)

- a. Loss of 10 acres of Type 1 bottomland hardwoods. Failure of erosion control could impact upon Type 3 marsh and main channel border habitat.
- b. Water quality impacts expected to be minor and temporary. Size of site would make it difficult to meet State effluent standards.
- c. Adverse floodplain impacts.
- d. Potential beneficial recreation impacts from creation of sandy open area near river.
- e. Known cultural resources in immediate area with National Register eligibility potential; survey required prior to use.
- f. No appreciable social impact.

4.52 (NED)

- a. Disturbance of 35 acres of Type 1 bottomland hardwoods. Failure of erosion control measures would impact on main channel border habitat.
- b. Water quality impacts expected to be temporary and minor.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from creation of open sandy area near river.
- e. High potential for cultural resource impacts; survey required before use.
- f. No appreciable social impacts.

#### 4.58 (NED)

- a. Degradation of 16 acres of Type 1 bottomland hardwoods disturbed by past disposal and 1,500 feet of shoreline habitat. Failure of erosion control would impact on riprap habitat and a large back-water slough (Type 4 deep marsh).
- b. Water quality impacts expected to be minor and temporary. Size of site would make it difficult to meet State effluent standards.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from creation of sandy area adjacent to the river.
- e. Low potential for cultural resource impacts. Survey required before use.
- f. No appreciable social impacts.

#### 4.59 (NED)

- a. Serious degradation 4,000 feet of shoreline and main channel border habitat. Erosion would cause impacts on additional aquatic habitat.
- b. Water quality impacts expected to be temporary and minor.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from beach nourishment.
- e. Moderate potential for cultural resource impacts; survey required before use.
- f. No appreciable social impacts.

#### 4.60 (NED)

- a. Serious degradation of 5,000 feet of shoreline and main channel border habitat. Erosion would impact further upon aquatic habitat.
- b. Water quality impacts expected to be temporary and minor.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from beach nourishment.
- e. Moderate potential for cultural resource impacts; survey required before use.
- f. No appreciable social impacts.

#### 4.63 (NED) - Selected Site For Cut 10

- a. Disturbance of 7 acres of revegetating disposal site. Failure of erosion control would impact upon main channel border habitat and a backwater slough.
- b. Water quality impacts expected to be temporary and minor. Size of site would make meeting State effluent standards unlikely.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from maintaining open sandy area adjacent to the river.
- e. Low potential for cultural resource impact; survey required before use.
- f. No appreciable social impacts.

#### 4.67 (NED)

- a. Loss of 6 acres of bottomland hardwoods that includes a known bald eagle roost.
- b. Water quality impacts expected to be temporary and minor. Size of site would make meeting State effluent standards unlikely.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from creation of open sandy area adjacent to river.
- e. High potential for cultural resource impacts; survey required before use.
- f. No appreciable social impacts.

#### Summary of Site Selection - Pool 4

- 4.087 Sites 4.02 and 4.20 were selected as the primary and secondary sites for Cuts 1, 2, and 3 over sites 4.69 and 4.13 because of lesser impacts. Site 4.04 became unavailable because of recreational development plans at the site by the City of Alma. Site 4.02 is preferred over site 4.20 because of the greater demand for the material on the Wisconsin side of the river, especially by Buffalo County and the City of Alma.
- 4.088 Site 4.25 is recommended as the primary site for Cut 4 because of lesser impacts than would occur at 4.16 and also because the material would be readily available for beneficial use. Sites 4.18, 4.19, and 4.20 have too little volume for this cut but could be used as rehandling sites for material destined for disposal at 4.25.
- 4.089 Site 4.24 is recommended as the primary site for Cut 5 because of its large capacity and lesser impacts than would occur at Site 4.29. Site 4.29 is nearing capacity and would have to be expanded or have material removed to be used in the long term.
- 4.090 Site 4.37 and 4.38 were selected as the primary and secondary sites for Cut 6 to provide safe areas for containing contaminated dredged material from the lower end of Cut 6 should it ever need to be dredged again, an unlikely occurrence.
- 4.091 Site 4.49 is the recommended site for Cut 7 because of ready access from the dredge cut and somewhat lesser impacts than would occur at 4.47 and 4.48. Site 4.47 is recommended as a secondary site over 4.48 because of lesser impacts and ~~because~~ the material could be used to enhance Coville Park. Site 4.57 would not have the capacity for this cut since it is also recommended for use for other dredge cuts in the pool.
- 4.092 Site 4.57 is the recommended site for Cuts 8, 9, and 11 because of its large capacity, considerable beneficial use demand, and minimal known impacts, and because the material would be available for future industrial development by the City of Red Wing.
- 4.093 Site 4.63 is recommended for Cut 10 because of the minor adverse impacts associated with its use, the recreation benefits to be gained, and the ease of access from the dredge cut.

TABLE 4.8

## POOL 5

<u>Cut</u>	<u>Primary Alternatives</u>
1. Mt. Vernon Light	5.03; 5.30
2. Somerfield Island	5.06; 5.30
3. Lower Zumbro	5.07; 5.30
4. Fisher Island	5.12; 5.30
5. Below West Newton	5.14; 5.24; 5.26; 5.26A; 5.28
6. West Newton	5.18; 5.24; 5.26; 5.26A; 5.28
7. Mule Bend	5.21; 5.24; 5.26; 5.26A; 5.28
8. Lower Approach to L/D 4	5.24; 5.25; 5.26; 5.26A; 5.28

Impacts of Site Use5.30 (EQ) - Selected Site for Cuts 1-4

- a. Disposal at site 5.30 would involve actual disposal of small volumes of material at strategic locations within the Weaver Bottoms to act as side channel closure dams. This disposal would destroy 16.3 acres of Type 4 and 5 wetland habitat. An additional 60 acres of Type 5 wetland would be converted to Types 1, 3, and 4 wetland if the recommended islands are constructed. The fish and wildlife habitat of the backwaters in the entire bottoms (4,000 acres) would be significantly improved. Riprap armoring of the dredged material dikes would prevent adverse erosion impacts.
- b. Water quality impacts expected to be relatively minor and short-term in duration. State standards for turbidity and suspended solids would be violated during disposal.
- c. Adverse floodplain impacts.
- d. Potential beneficial recreation impacts through the creation of additional open sandy areas adjacent to the channel.
- e. No cultural resource impacts.
- f. No appreciable social impacts.

5.03 (NED)

- a. Loss of 2 acres of old dredged material island and 6 acres of open water habitat. Creation of 10 acres of sheltered waters that would be expected to become Type 3-4 deep marsh. Riprap would provide additional fishery habitat. Failure of erosion control would impact upon valuable downstream fishery habitat.
- b. Water quality impacts expected to be minor and short-term. State standards for turbidity and suspended solids would be violated during disposal.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from enlarging open sandy island.
- e. No cultural resource impacts.
- f. No appreciable social impacts.

5.06 (NED)

- a. No appreciable fish and wildlife impacts associated with use of this site as is. Expansion of the site or failure of erosion control efforts would have adverse impacts on main channel border and Type 3, 4, and 5 wetland habitats.
- b. Water quality impacts expected to be temporary and minor.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from maintaining a sandy island adjacent to the channel.
- e. No cultural resource impacts.
- f. No appreciable social impacts.

5.07 (NED)

- a. Minimal fish and wildlife impacts associated with the use of the site as is. Expansion of the site or failure of erosion control measures would impact on main channel border and Type 3, 4, and 5 wetland habitats.
- b. Water quality impacts expected to be temporary and minor.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from maintaining a sandy island area adjacent to the channel.
- e. No cultural resource impacts.
- f. No appreciable social impacts.

5.12 (NED)- Recommended as Suitable for Temporary Disposal for Cut 5

- a. Disturbance of 24 acres of revegetating disposal site. Expansion of the site or failure of erosion control would impact on main channel border habitat, side channels, and Type 3-4 deep marshes.
- b. Water quality impacts expected to be temporary and minor.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from creating an open sandy area adjacent to the channel.
- e. No cultural resource impacts.
- f. No appreciable social impacts.

5.14 (NED)

- a. Disturbance of 16 acres of revegetating disposal site. Failure of erosion control would impact upon riprap and wing dam habitat and back-water sloughs and marshes.
- b. Water quality impacts expected to be temporary and minor.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from creation of open sandy area adjacent to the river.
- e. No cultural resource impacts.
- f. No appreciable social impacts.

5.18 (NED) - Recommended as Suitable for Temporary Disposal for Cuts 6 and 7

- a. Minimal fish and wildlife impacts at present site. Expansion of the site or failure of erosion control would impact on Type 3, 4, and 5 backwater sloughs and marshes.
- b. Water quality impacts expected to be temporary and minor.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from maintaining an open sandy area adjacent to the river.
- e. No cultural resource impacts.
- f. No appreciable social impacts.

5.21 (NED)

- a. Loss of 16 acres of Type 1 bottomland hardwoods. Failure of erosion control would impact on main channel border habitat.
- b. Water quality impacts expected to be minor and temporary.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from creation of open sandy area adjacent to the channel.
- e. High potential for cultural resource impact; survey required before use.
- f. No appreciable social impacts.

5.24 (EQ) - Secondary Site for Cuts 5-8

- a. Minimal fish and wildlife impacts.
- b. No water quality impacts.
- c. No floodplain impacts.
- d. No recreation impacts.
- e. Potential for cultural resource impacts; survey required before use.
- f. Loss of agricultural land.
- g. Material available for beneficial use.
- h. Potential wind erosion impact on an adjacent proposed State scientific use.

5.25 (NED)

- a. Loss of 3 acres of Type 1 bottomland hardwoods.
- b. Water quality impacts temporary and minor. Size of site would make meeting State effluent standards unlikely.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from creation of open sandy area adjacent to river.
- e. High potential for cultural resource impacts; survey required prior to use.
- f. No appreciable social impacts.



5.26 - Tertiary Site for Cuts 5-8

- a. Loss of 15 acres of bottomland hardwoods, Type 3, 4, and 5 sloughs, and open water habitats.
- b. No water quality impacts.
- c. Potential adverse floodplain impacts.
- d. Loss of important recreational fishing area.
- e. Potential cultural resource impact; survey required prior to use.
- f. No appreciable social impacts.

5.26A - Selected Site for Cuts 5-8

- a. Loss of approximately 15 acres of bottomland hardwoods. Possible adverse impact on bald eagle roosting.
- b. Water quality impacts expected to be temporary and minor.
- c. Potential adverse floodplain impacts if material not removed prior to seasonal high water.
- d. No recreation impacts.
- e. Potential cultural resource impact; survey required prior to use.
- f. No appreciable social impacts.
- g. Material available for beneficial use.

5.28 - Tertiary Site for Cuts 5-8

- a. Minimal fish and wildlife impacts at site. Significant adverse impacts upon side channel and deep marsh habitat gaining barge access to site.
- b. No appreciable water quality impacts.
- c. No floodplain impacts.
- d. No recreation impacts.
- e. Low potential for cultural resource impacts; survey required before use.
- f. No appreciable social impacts.
- g. Material available for beneficial use.

Summary of Site Selection - Pool 5

4.094 Site 5.30 was selected for Cuts 1-4 because of the overall significant fish and wildlife habitat enhancement benefits projected to be achieved by the Weaver Bottoms Rehabilitation Study. Continued disposal at sites 5.06, 5.07, and 5.12 would have significant adverse impacts in the long term with no real opportunity to put the material to beneficial use.

4.095 In the selection of a site for Cuts 5-8, GREAT recognized that the most desirable appearing sites from the viewpoint of minimizing impacts and maximizing beneficial use of the dredged material needed additional study to prove feasibility or further evaluate environmental impacts. Thus GREAT chose to select sites based on existing preferences while recognizing the need for further study. Site 5.26A was selected as the primary or most preferential site because it has the potential for maximizing beneficial use of dredged material while minimizing impacts to the greatest extent. Further study is necessary to evaluate the economic feasibility of this alternative.

4.096 Site 5.24 is recommended as the secondary site because of lesser impacts than would occur at 5.26 or 5.28. Further study is needed here to evaluate impacts on a proposed State scientific area adjacent to the site.

4.097 Site 5.26 was selected over 5.28 for third preference primarily because of lesser impacts associated with its use.

4.098 Sites 5.14, 5.18, 5.21, and 5.25 were not considered acceptable because the combined impacts of using these sites would be greater than use of one of the larger capacity sites (5.26A, 5.24, 5.26, or 5.28). Also these sites would not be readily available for beneficial uses of the material other than on-site recreational uses.

TABLE 4.9

## POOL 5A

<u>Cut</u>	<u>Primary Alternatives</u>
1. Upper Approach to L/D 5A	5A.04; 5A.25; 5A.32; 5A.35
2. Wild's bend	5A.08; 5A.25; 5A.32; 5A.35
3. Head of Betsy Slough	5A.20; 5A.25; 5A.27/.33; 5A.32
4. Fountain City	5A.20; 5A.25; 5A.27/.33; 5A.34
5. Island 58	5A.14; 5A.20; 5A.21; 5A.23; 5A.27/.33; 5A.36
6. Lower Approach to L/D 5	5A.20; 5A.21; 5A.23; 5A.27/.33

Impacts of Site Use5A.04 (NED)

- a. Loss of 8 acres of Type 1 bottomland hardwoods and open sandy island. Failure of erosion control would impact on riprap habitat and a Type 3-4 backwater slough.
- b. Water quality impacts expected to be temporary and minor. Size of site would make it difficult to meet State effluent standards.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from creating an open sandy island area.
- e. Moderate potential for cultural resource impacts; survey required before use.
- f. No appreciable social impacts.

5A.32 - Selected Site for Cuts 1-3

- a. Loss of 5 acres of Type 1 bottomland hardwoods and 29 acres of Type 3-4 deep marsh. Failure of erosion control would impact on Type 3, 4, and 5 marsh.
- b. Water quality impacts expected to be temporary and minor.
- c. Potential adverse floodplain impacts.
- d. No recreation impacts.
- e. Moderate potential for cultural resource impacts; survey required before use.
- f. No appreciable social impacts.
- g. Material removed for beneficial use.

5A.35 (EQ)

- a. Loss of 52 acres of open water habitat in Polander Lake. Creation of 52 acres of island and shallow marsh for wildlife habitat improvement.
- b. Water quality impacts expected to be moderate. Violation of State standards for turbidity and suspended solids during disposal.
- c. Adverse floodplain impacts.
- d. No recreation impacts.
- e. No cultural resource impacts.
- f. No appreciable social impacts.

5A.08 (NED) - Recommended as Suitable for Temporary Disposal for Cut 2

- a. Loss of 15 acres of revegetating disposal area habitat. Failure of erosion control would impact on Type 3, 4, and 5 deep marshes and sloughs as well as wing dam habitat.
- b. Water quality impacts expected to be temporary and minor. Nature of site would make compliance with State effluent standards unlikely.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from creation of an open sandy area adjacent to the river.
- e. No cultural resource impacts.
- d. No appreciable social impacts.

5A.25 (NED, EQ) - Selected Site for Cut 4; Secondary Site for Cuts 1 and 2

- a. Continual disturbance of 6 acres of disturbed bottomland hardwoods. Potential erosion impacts on downstream riprap and wing dams.
- b. Water quality impacts expected to be temporary and minor. Size of site would make compliance with State effluent standards highly unlikely.
- c. Potential adverse floodplain impacts.
- d. Beneficial recreation impacts from creation of an open sandy area adjacent to the river.
- e. No cultural resource impacts.
- f. No appreciable social impacts.
- g. Material removed for beneficial use.

5A.27/.33 (EQ)

- a. Disturbance of 8 acres of upland meadow.
- b. No water quality impacts.
- c. Potential adverse floodplain impacts.
- d. No recreation impacts.
- e. No cultural resource impacts.
- f. No appreciable social impacts.
- g. Material removed for beneficial use.

5A.34 (NED)

- a. Loss of 12 acres of Type 1 bottomland hardwoods and 6 acres of Type 2, 3, and 4 marshes. Failure of erosion control would impact on main channel border habitat and backwater sloughs and marshes.
- b. Water quality impacts expected to be temporary and minor.
- c. Adverse floodplain impacts.
- d. No recreation impacts.
- e. Low potential for cultural resource impacts; survey required before use.
- f. No appreciable social impacts.

5A.20 (EQ)

- a. Disturbance of 18 acres of cropland and upland meadow habitat.
- b. No water quality impacts.
- c. No floodplain impacts.
- d. No recreation impacts.
- e. High potential for cultural resource impacts; survey required before use.
- f. Loss of agricultural production on site.
- g. Material removed for beneficial use.

5A.21 (EQ)

- a. Disturbance of 12 acres of cropland and upland meadow habitat.
- b. No water quality impacts.
- c. No floodplain impacts.
- d. No recreation impacts.
- e. High potential for cultural resource impact; survey required before use.
- f. Loss of agricultural production on site.
- g. Material removed for beneficial use.

5A.14 (NED) - Recommended as Suitable for Temporary Disposal for Cuts 4 and 5

- a. Disturbance of 25 acres of Type 1 bottomland hardwoods and 7 acres of previously used disposal site habitat. Failure of erosion control would impact on riprap and wing dam habitat.
- b. Water quality impacts expected to be temporary and minor.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from creation of an open sandy area adjacent to the river.
- e. Low potential for cultural resource impacts; survey required before use.
- f. No appreciable social impacts.

5A.23 (NED, EQ) - Selected Site for Cuts 5 & 6

- a. Loss of 7 acres of disturbed Type 1 bottomland hardwoods. Failure of erosion control would impact on backwater habitat and wing dams.
- b. Water quality impacts expected to be temporary and minor. Size of site would make meeting State effluent standards unlikely.
- c. Potential adverse floodplain impacts.
- d. No recreation impacts.
- e. Low potential for cultural resource impacts; survey required before use.
- f. No appreciable social impacts.
- g. Material removed for beneficial use.

5A.36 - Secondary Site for Cut 5

- a. No fish and wildlife impacts.
- b. No water quality impacts.
- c. No floodplain impacts.
- d. No recreation impacts.
- e. Low potential for cultural resource impacts; survey required before use.
- f. No appreciable social impacts.
- g. Material removed for beneficial use.

Summary of Site Selection - Pool 5A

4.099 Sites 5A.32, 5A.25, and 5A.23 are the recommended sites for Pool 5A primarily because this combination of sites provides the needed capacity and the maximum satisfaction to beneficial use demands with the least adverse impact. Site 5A.36 is recommended as a secondary site and not a primary site because of limited capacity at the site and somewhat more difficult access problems than at site 5A.23.

TABLE 4.10

## POOL 6

<u>Cut</u>	<u>Primary Alternatives</u>
1. Homer Point	6.11; 6.17
2. Gravel Point	6.14; 6.17; 6.19/.20
3. Below Winona RR Bridge	6.17; 6.19/.20
4. Above Winona RR Bridge	6.16; 6.17; 6.19/.20
5. Island 71 and Boat Harbor	6.27
6. Lower Approach to L/D 5A	6.27

Impacts of Site Use6.11 (NED, EQ) - Secondary Site for Cut 1

- a. Disturbance of 7 acres of old disposal and Type 1 bottomland hardwoods. Access road would alter additional bottomland hardwood habitat. Failure of erosion control would impact on wing dam and riprap habitat and a small backwater slough.
- b. Water quality impacts expected to be temporary and minor.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from maintaining an open sandy area adjacent to the river.
- e. No cultural resource impacts.
- f. No appreciable social impact.

6.17 (NED) - Selected Site for Cuts 1-3; Tertiary Site for Cut 4

- a. Loss of 21 acres of Type 3-4 wetlands being developed for industrial purposes by the City of Winona.
- b. No water quality impacts.
- c. No floodplain impacts.
- d. No recreation impacts.
- e. No cultural resource impacts.
- f. Site is being developed by the City of Winona for industrial park. Disposal may provide fill for this project.
- g. Material removed for beneficial use.

6.14 (NED)

- a. Loss of 6 acres Type 1 bottomland hardwood. Open water habitat impacted by disposal on a very small island. Erosion impacts on side channels and a wing dam.
- b. Water quality impacts expected to be temporary and minor. Size of site would make it unlikely State effluent standards could be met.
- c. Potential adverse floodplain impacts.
- d. Beneficial recreation impacts for creation of an open sandy area adjacent to the river.
- e. No cultural resource impacts.
- f. No appreciable social impacts.

6.16 (NED)

- a. Loss of 3 acres of Type 2 wet meadow and 5 acres of Type 3-4 marsh.
- b. No water quality impacts.
- c. No floodplain impacts.
- d. No recreation impacts.
- e. No cultural resource impacts.
- f. Use of site may make it more attractive for industrial or commercial development.
- g. Material available for beneficial use.

6.19/.20 (EQ) - Selected and Secondary Sites for Cut 4

- a. No fish and wildlife impacts.
- b. No water quality impacts.
- c. No floodplain impacts.
- d. No recreation impacts.
- e. No cultural resource impacts.
- f. Removal of material from these sites would increase truck traffic through portions of Winona.
- g. Material removed for beneficial use.

6.27 (NED, EQ) - Selected Site for Cuts 5 and 6

- a. No fish and wildlife impacts.
- b. No water quality impacts.
- c. Potential adverse floodplain impacts.
- d. No recreation impacts.
- e. No cultural resource impacts.
- f. No appreciable social impacts.
- g. Material removed for beneficial use.

Summary of Site Selection - Pool 6

4.100 Pool 6 is somewhat of an anomaly because the demand for dredged material generally exceeds the supply. Thus sites 6.17, 6.19, 6.20, and 6.27 are the recommended sites because they are either stockpile sites or actual sites where the material will be put to beneficial use.



TABLE 4.11

## POOL 7

<u>Cut</u>	<u>Primary Alternatives</u>
1. Upper Approach to L/D 7	7.01; 7.20
2. Dresbach	7.01; 7.04; 7.05; 7.06; 7.13; 7.20; 8.06
3. Dakota	7.04; 7.06; 7.12
4. Winter's Landing	7.04; 7.06; 7.11
5. Queen's Bluff	7.04; 7.06; 7.10
6. Richmond Island	7.04; 7.05; 7.06
7. Lower Approach to L/D 6	7.06

Impacts of Site Use7.01 (EQ, NED) - Secondary Site for Cuts 1-2

- a. No appreciable fish and wildlife impacts.
- b. No water quality impacts.
- c. No floodplain impacts.
- d. No recreation impacts.
- e. No cultural resource impacts.
- f. Potential noise and disturbance impacts on nearby residences.
- g. Material removed for beneficial use.

7.20 - Selected Site for Cuts 1-2

- a. No known fish and wildlife impacts. Potential loss of bald eagle roosting habitat.
- b. No water quality impacts.
- c. No floodplain impacts.
- d. No recreation impacts.
- e. Moderate potential for cultural resource impact; survey required before use.
- f. No appreciable social impacts.
- g. Material removed for beneficial use.

7.13

- a. Loss of 39 acres of revegetated disposal site and bottomland hardwood. The revegetated area has taken on the character of sand prairie. Failure of erosion control would impact on backwater sloughs and marshes and open water habitat including wing dams.
- b. Water quality impacts expected to be temporary and minor.
- c. Adverse floodplain impacts.
- d. No recreation impacts.
- e. No cultural resource impacts.
- f. No appreciable social impacts.

7.12 (NED) - Recommended as Suitable for Temporary Disposal for Cut 3

- a. Disturbance of 10 acres of old disposal and 5 acres of Type 1 bottomland hardwoods. Failure of erosion control would impact on wing dam and side channel habitat.
- b. Water quality impacts expected to be temporary and minor. Size and configuration of site would make meeting State effluent standards unlikely.
- c. Adverse floodplain impacts.
- d. No recreation impacts.
- e. No cultural resource impacts.
- f. No appreciable social impacts.

7.04 (EQ, NED)

- a. Loss of 30 acres Type 1 bottomland hardwoods and 2 acres Type 4 deep marsh. Failure of erosion control would impact on backwater wetlands and sloughs and downstream wing dams and side channels.
- b. Water quality impacts expected to be temporary and minor.
- c. Adverse floodplain impacts.
- d. No recreation impacts.
- e. No cultural resource impacts.
- f. No appreciable social impacts.
- g. Material removed for beneficial use.

7.06 (EQ, NED) - Selected Site for Cuts 3-5 and 7; Tertiary Site for Cut 2

- a. Loss of 14 acres of old fish ponds that reverted to Type 4-5 deep marsh and 4 acres of Type 1 bottomland hardwoods.
- b. Water quality impacts expected to be temporary and minor.
- c. No floodplain impacts.
- d. Beneficial recreation impacts from creation of an open sandy area adjacent to the river.
- e. Moderate potential for cultural resource impacts; survey required before use.
- f. No appreciable social impacts.
- g. Material removed for beneficial use.

7.11 (NED) - Recommended as Suitable for Temporary Disposal for Cut 4

- a. Loss of 20 acres of Type 1 bottomland hardwoods and degradation of 1,000 feet of shoreline habitat. Erosion would impact on downstream wing dams and side channels.
- b. Water quality impacts for both portions of the site are expected to be temporary and minor. State standards for turbidity and suspended solids would be violated at the beach nourishment site.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from creation of an open sandy area adjacent to the river.
- e. No cultural resource impacts.
- f. No appreciable social impacts.

7.10 (NED)

- a. Loss of 6 acres of revegetating disposal site and one acre of Type 4 deep marsh. Failure of erosion control would result in impacts on wing dams and side channels.
- b. Water quality impacts expected to be temporary and minor. Size of site would make it unlikely that State effluent standards could be met.
- c. Potential adverse floodplain impacts.
- d. No recreation impacts.
- e. High potential for cultural resource impacts; survey required before use.
- f. No appreciable social impacts.

7.05 - Selected Site for Cut 6; Tertiary Site for Cut 2

- a. Loss of 12 acres of old fish pond, bottomland hardwood, and disturbed habitat.
- b. Water quality impacts are expected to be temporary and minor.
- c. Potential adverse floodplain impacts.
- d. Beneficial recreation impacts from a Minnesota DNR proposal to create a public access point at this site.
- e. Low potential for cultural resource impact; survey required before use.
- f. No appreciable social impacts.
- g. Material removed for beneficial use.

Summary of Site Selection - Road 1

- 4.101 Sites 7.20 and 7.01 are the recommended primary and secondary sites for Cuts 1 and 2. They were chosen over 7.13 because of lesser impacts and because material would be used for beneficial uses. Sites 7.04, 7.05, 7.06, and 7.11 were not selected for these cuts because of the greater distances involved in transporting material to these sites. Site 7.20 is preferred over site 7.01 because some beneficial use of the material identified at the site is possible.
- 4.102 Site 7.06 is the recommended site for Cuts 3-7 and 7 because of the high demand for the material at this site and ease of access to it. The loss of habitat at this site would be less than would occur at a combination of 7.10, 7.11, and 7.12 or at 7.04.
- 4.103 Site 7.05 was selected because of the need for material at the site to develop a public access point and to avoid straining the capacity at 7.01.

<u>Cut</u>	<u>Primary Alternatives</u>
1. Warner's Landing	8.06; 8.22; 8.30; 8.31
2. Crosby Slough	8.01; 8.06; 8.22; 8.30
3. Below Raft Channel	8.06; 8.20; 8.30
4. Head of Raft Channel	8.02; 8.30
5. Brownsville	8.06; 8.30
6. Above Brownsville	8.06; 8.17; 8.30
7. Picayune Island	8.06
8. Root River	8.06
9. Sand Slough	8.06; 8.15
10. La Crosse RR Bridge	8.06; 8.28

Impacts of Site Use

8.31 (NED)

- a. Loss of 3 acres of Type 4 deep marsh. Erosion impacts on additional deep marsh habitat.
- b. Water quality impacts expected to be temporary and moderate.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from eventual creation of a sandy island next to channel.
- e. No cultural resource impacts.
- f. No appreciable social impacts.

8.22 - Selected Site for Cuts 1-2

- a. Minimal fish and wildlife impacts on the site. Rehandling of material to reach site would impact on 1-2 acres of shallow water habitat.
- b. Water quality impacts expected to be temporary and minor.
- c. No floodplain impacts.
- d. No recreation impacts.
- e. A known archaeological site exists at the northern end of the disposal area. Disposal would be handled to avoid impacting on this known resource. The remainder of the disposal site would have to be surveyed prior to its use.
- f. Potential noise and disturbance impacts on adjacent residential development. Loss of agricultural production.
- g. Material available for beneficial use.

8.01 (NED)

- a. Loss of 10 acres of Type 1 bottomland hardwoods. Rehandling of material to reach the site would impact 1-2 acres of shallow water habitat.
- b. Water quality impacts expected to be temporary and minor.
- c. Potential adverse floodplain impacts.
- d. Potential recreation benefits from creation of an open sandy riparian area.
- e. Moderate potential for cultural resource impact; survey required before use.
- f. No appreciable social impacts.
- g. Material available for beneficial use.

8.20 (NED)

- a. Loss of 3 acres of Type 1 bottomland hardwoods and 4 acres of Type 4 deep marsh. Failure of erosion control would impact on wing dams and additional Type 4 deep marsh.
- b. Water quality impacts expected to be temporary and minor. Size and nature of site would make meeting State effluent standards unlikely.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from creation of open sandy island area adjacent to the channel.
- e. No cultural resource impacts.
- f. No appreciable social impacts.

8.02 (NED)

- a. Loss of 55-80 acres of Type 3-4 wetland interspersed with Type 1 bottomland hardwoods. Failure of erosion control would impact on rip-rap and side channel habitats.
- b. Water quality impacts expected to be temporary and moderate.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from creation of open sandy riparian area.
- e. Moderate potential for cultural resource impact; survey required before use.
- f. No appreciable social impacts.
- g. Material available for beneficial use.

8.30 (EO, NED) - Selected Site for Cuts 3-5

- a. Loss of 22 acres of Type 1 bottomland hardwoods and 11 acres of Type 3-4 deep marsh. Failure of erosion control would impact on wing dams, riprap, and backwater marshes.
- b. Water quality impacts expected to be temporary and minor.
- c. Adverse floodplain impacts.
- d. Potential recreation benefits from creation of open sandy area adjacent to the channel.
- e. No cultural resource impacts.
- f. No appreciable social impacts.
- g. Material removed for beneficial use.

8.06 (EQ, NED) - Selected Site for Cuts 6-9; Secondary Site for Cut 10

- a. No appreciable fish and wildlife impacts.
- b. Water quality impacts expected to be temporary and minor.
- c. No floodplain impacts.
- d. No appreciable recreation impacts.
- e. Moderate potential for cultural resource impacts; survey required before use.
- f. No appreciable social impacts.
- g. Material removed for beneficial use.

8.17 (NED)- Recommended as Suitable for Temporary Disposal for Cut 6

- a. Minimal fish and wildlife impacts on the site. Failure of erosion control would impact on main channel border and backwater marsh habitat.
- b. Water quality impacts expected to be temporary and minor. Size and configuration of site would make it difficult to meet State effluent standards.
- c. Potential adverse floodplain impacts.
- d. Beneficial recreation impacts from creating an open sandy area adjacent to the channel.
- e. No cultural resource impacts.
- f. No appreciable social impacts.
- g. Material available for beneficial use.

8.15 (NED)

- a. Loss of 12 acres of Type 1 bottomland hardwoods. Failure of erosion control would impact on main channel border and backwater marsh habitats.
- b. Water quality impacts expected to be temporary and minor.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from maintaining these islands in an open sandy condition.
- e. No cultural resource impacts.
- f. No appreciable social impacts.

8.28 (NED) - Selected Site for Cut 10

- a. Disturbance of main channel border habitat.
- b. Water quality impacts expected to be temporary and minor. State standards for turbidity and suspended solids violated during beach nourishment.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from beach nourishment.
- e. No cultural resource impacts.
- f. No appreciable social impacts.

Summary of Site Selection - Pool 8

- 4.104 Site 8.22 was selected over sites 8.01 and 8.31 for Cuts 1 and 2 because of lesser impacts on fish and wildlife habitat and because material placed at this site would be readily available for beneficial use. Site 8.22 was selected over 8.30 because 8.30 would not have the capacity to handle all the material from Cuts 1 and 2 and Cuts 3-5. Use of site 8.06 would involve excessive barging costs.
- 4.105 Site 8.30 was selected for Cuts 3-5 because it has the capacity to handle the material from these three cuts with lesser impacts than at 8.02. Site 8.20 does not have the capacity for more than one cut and its use would have substantial adverse impact. GREAT believes the loss of habitat at Site 8.30 is a reasonable tradeoff in obtaining a site with sufficient capacity to handle three high volume dredge cuts and where the material would be available for beneficial use.
- 4.106 Site 8.06 is the recommended site for Cuts 6-9 and the secondary site for Cut 10 because of minimal site impacts, large capacity, large potential beneficial use demand, and ease of access by barge to the site.
- 4.107 Site 8.28 is the selected site for Cut 10 to provide material for a specific need (i.e., fill around foundations of local residences).



TABLE 4.13

POOL 9

<u>Cut</u>	<u>Primary Alternatives</u>
1. Crooked Slough	9.34; 9.41; 9.47
2. Above Atchafalya	9.26; 9.42; 9.47
3. Lansing Upper Light	3.06; 9.03; 9.04; 9.17; 9.26; 9.28; 9.47
4. Indian Camp Light	8.06; 9.07; 9.08; 9.18
5. DeSoto	8.06; 9.07; 9.08; 9.36
6. Head of Battle Island	3.06; 9.11; 9.33
7. Below Twin Island	8.06; 9.11; 9.15; 9.20; 9.33; 9.40; 9.45
8. Twin Island	8.06; 9.11; 9.15; 9.33; 9.38; 9.40; 9.45
9. Island 126	8.06; 9.11; 9.15; 9.21; 9.33; 9.39; 9.40
10. Lower Approach to L/D 8	8.06; 9.11; 9.15; 9.33; 9.39; 9.40

Impacts of Site Use9.41 (EQ) - Secondary Site for Cut 1

- a. Loss of 9 acres of bottomland forest.
- b. No water quality impacts.
- c. No floodplain impacts.
- d. No recreation impacts.
- e. Adverse impacts on known cultural resources
- f. No appreciable social impacts.
- g. Material available for beneficial use.

9.34 (NED)

- a. Loss of 3 acres of Type 4 deep marsh. Erosion impacts on additional deep marsh habitat.
- b. Water quality impacts expected to be temporary and minor. State standards for turbidity would be violated.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from maintaining sandy island.
- e. No cultural resource impacts.
- f. No appreciable social impacts.

9.47 (EQ, NED) - Selected Site for Cuts 1-2; Secondary Site for Cut 3

- a. No fish and wildlife impacts at site. Potential erosion impacts on riprap habitat and on main channel border habitat containing a mussel bed in which the Higgins' eye pearly mussel, an endangered species, has been found.
- b. No water quality impacts.
- c. Potential adverse floodplain impacts.
- d. No recreation impacts.
- e. Low potential for cultural resource impacts; survey required before use.
- f. No appreciable social impacts.
- g. Material removed for beneficial use.

#### 9.04 (NED)

- a. Loss of 3 acres of Type 1 bottomland hardwoods and 3 acres Type 2-3 marsh.
- b. Water quality impacts expected to be temporary and minor. Size of the site would make it difficult to meet State effluent standards.
- c. Adverse floodplain impacts.
- d. No recreation impacts.
- e. High potential for cultural resource impacts; survey required before use.
- f. No appreciable social impact.

#### 9.28 - Tertiary Site for Cut 3

- a. Potential loss of up to 33 acres Type 3, 4, and 5 marsh.
- b. Water quality impacts expected to be temporary and minor.
- c. Potential adverse floodplain impacts.
- d. No recreation impacts.
- e. Moderate potential for cultural resource impacts; survey required before use.
- f. Site is to be considered for development as a marina by the State of Iowa.

#### 9.07 - Selected Site for Cuts 4-5

- a. Loss of 2 acres of disturbed upland habitat, 3 acres of bottomland hardwoods, and 10 acres of Type 3-4 marsh. Failure of erosion control would impact on a backwater slough.
- b. No water quality impacts.
- c. No floodplain impacts.
- d. No recreation impacts.
- e. Low potential for cultural resource impact; survey required prior to use.
- f. Potential noise and disturbance impacts on nearby residential areas.
- g. Material removed for beneficial use.

#### 9.08 (EQ)

- a. No appreciable fish and wildlife impacts.
- b. No water quality impacts.
- c. No floodplain impacts.
- d. No recreation impacts.
- e. No cultural resource impacts.
- f. Adverse impacts upon a commercial enterprise on the site.
- g. Material available for beneficial use.

#### 9.18 (NED) - Recommended as Suitable for Temporary Disposal for Cut 4

- a. Loss of 23 acres of Type 1 bottomland hardwoods. Failure of erosion control would impact on Type 3-4 backwater sloughs. Loss of bald eagle roost area.
- b. Water quality impacts expected to be temporary and minor.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from creation of an open sandy area adjacent to the river.
- e. High potential for cultural resource impacts; survey required before use.
- f. No appreciable social impacts.

9.36 (NED)

- a. Loss of 8 acres of Type 1 bottomland hardwoods. Failure of erosion control would impact on additional bottomland hardwoods and Type 3-4 deep marsh.
- b. Water quality impacts expected to be temporary and minor. Size of site would make compliance with State effluent standards unlikely.
- c. Potential adverse floodplain impacts.
- d. No recreation impacts.
- e. Low potential for cultural resource impacts; survey required before use.
- f. No appreciable social impacts.

9.11 - Selected Site for Cut 6; Secondary Site for Cuts 7-10

- a. Loss of 5 acres of Type 1 bottomland hardwoods. Failure of erosion control would impact additional bottomland hardwoods and backwater sloughs.
- b. Water quality impacts expected to be temporary and minor. Size of site would make it difficult to meet State effluent standards.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from creation of an open sandy area adjacent to the river.
- e. Moderate potential for cultural resource impacts; survey required before use.
- f. Potential noise impacts on nearby residences.
- g. Material removed for beneficial use.

9.33 - Secondary Site for Cut 6; Tertiary Site for Cuts 7-10

- a. Loss of 12 acres of Type 1 bottomland hardwoods and 1 acre Type 3 shallow marsh.
- b. No appreciable water quality impacts.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from creation of an open sandy area adjacent to the river.
- e. Low potential for cultural resource impacts; survey required before use.
- f. No appreciable social impacts.
- g. Material removed for beneficial use.

9.20 (NED) - Recommended as Suitable for Temporary Disposal for Cut 8

- a. Minimal impacts upon fish and wildlife. Failure of erosion control would impact on Type 3-4 marshes, side channels, and riprap habitat.
- b. Water quality impacts expected to be temporary and minor.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impact from creation of an open sandy island.
- e. Low potential for cultural resource impacts; survey required before use.
- f. No appreciable social impacts.

9.15 (EQ) - Selected Site for Cuts 7-10

- a. No fish and wildlife impacts.
- b. No water quality impacts.
- c. No floodplain impacts if material is removed prior to seasonal high water.
- d. No recreation impacts.
- e. Low potential for cultural resource impacts; survey required before use.
- f. No appreciable social impacts.
- g. Material removed for beneficial use.

9.38 (NED)

- a. Loss of 13 acres of Type 1 bottomland hardwoods. Failure of erosion control would impact on riprap habitat and additional bottomland hardwoods.
- b. Water quality impacts expected to be temporary and minor.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from creation of an open sandy area adjacent to the river.
- e. High potential for cultural resource impacts; survey required before use.
- f. No appreciable social impacts.

9.40

- a. Loss of 5 acres of Type 1 bottomland hardwoods.
- b. No water quality impacts.
- c. Adverse floodplain impacts.
- d. No recreation impacts.
- e. Moderate potential for cultural resource impacts; survey required before use.
- f. No appreciable social impacts.
- g. Material removed for beneficial use.

9.45

- a. Material used to redesign fish ponds at Federal hatchery. Ultimate benefits to fishery.
- b. No appreciable water quality impacts.
- c. No floodplain impacts.
- d. Beneficial recreation impacts from creation of an open sandy area.
- e. No cultural resource impacts.
- f. No appreciable social impacts.

9.42 (EQ)

- a. Disturbance of 11 acres of upland meadow and forest.
- b. No water quality impacts.
- c. No floodplain impacts.
- d. No recreation impacts.
- e. High potential for cultural resource impacts; survey required before use.
- f. No appreciable social impacts.
- g. Material available for beneficial use.

9.26 - Selected Site for Cut 3; Secondary Site for Cut 2

- a. Loss of 22 acres of Type 4 deep marsh of identified high value as northern pike spawning marsh. Potential impact on mussel beds.
- b. Water quality impacts expected to be moderate. State standards for turbidity would be violated.
- c. Adverse floodplain impacts.
- d. Substantial recreational benefits as the material would be used in the construction of a marina project.
- e. No cultural resource impacts.
- f. Positive social benefits associated with the development of the marina.

9.03 (EQ) - Tertiary Site for Cut 3

- a. Minimal fish and wildlife impacts.
- b. No water quality impacts.
- c. Potential adverse floodplain impacts.
- d. Beneficial recreation impacts from use of dredged material to elevate a baseball diamond.
- e. No cultural resource impacts.
- f. Potential noise and disturbance impacts on nearby residences.
- g. Material available for beneficial use.

9.17 - Recommended as Suitable for Temporary Disposal for Cut 3

- a. No appreciable fish and wildlife impacts on the site. Failure of erosion control would impact upon main channel border and backwater marsh habitat.
- b. Water quality impacts expected to be negligible.
- c. Potential adverse floodplain impacts.
- d. Beneficial recreation impacts from maintaining open sandy area adjacent to river.
- e. No cultural resource impacts.
- f. No appreciable social impact.

9.21 (NED)- Recommended as Suitable for Temporary Disposal for Cut 9

- a. Disturbance of 10 acres of revegetating disposal site. Failure of erosion control would impact on side channels and riprap shoreline.
- b. Water quality impacts expected to be temporary and minor.
- c. Adverse floodplain impacts.
- d. Beneficial recreation impacts from creation of an open sandy area adjacent to the river.
- e. Low potential for cultural resource impacts; survey required before use.
- f. No appreciable social impacts.

9.39 (NED)

- a. Loss of 10 acres of Type 1 wetland and 1 acre of Type 4 deep marsh. Failure of erosion control would impact on wing dam habitat.
- b. Water quality impacts expected to be temporary and minor.
- c. Potential adverse floodplain impacts.
- d. Beneficial recreation impacts from creation of an open sandy area adjacent to the river.
- e. High potential for cultural resource impacts; survey required before use.
- f. No appreciable social impacts.

Summary of Site Selection - Pool 9

- 4.108 Site 9.47 is the recommended site for Cuts 1 and 2 because of the minimal impacts associated with its use and because the material would be removed for beneficial use. Use of 9.47 would have less impact than would occur at 9.34, 9.41, or 9.42. It also has much better access than sites 9.41 or 9.42. Site 9.41 was selected as a secondary site over 9.42 because it would place some of the material on the Wisconsin side of the river to meet potential beneficial use demands there.
- 4.109 There is no clearly advantageous site for Cut 3 with sufficient volume for all the material from the cut. GREAT recommends four sites in order of priority for use for this cut. Site 9.26 is recommended as the first priority site if a marina is developed there. This development would be a high volume beneficial use of the material. Site 9.47 is the site of second priority due to minimal impacts and removal for beneficial use at this site. The only problem at 9.47 is capacity because it is the selected site for Cuts 1 and 2. Site 9.03 is the third choice, with capacity a potential problem at this site. Site 9.28 is the final choice, contingent upon development of a marina proposed by the Iowa Conservation Commission for this location.
- 4.110 Site 9.07 is the recommended site for Cuts 4 and 5 because of lesser impacts than would occur at sites 9.08, 9.18, and 9.36. The material would be available for beneficial use at 9.07.
- 4.111 Site 9.11 is the recommended site for Cut 6 and the secondary site for Cuts 7-10; and site 9.33 is the secondary site for Cut 6 and tertiary site for Cuts 7-10 because these sites provide large capacity areas with moderate impacts and where the material is readily available for beneficial use.
- 4.112 Site 9.15 was selected as the primary site for Cuts 7-10 because of negligible on-site impacts and beneficial use demands in the area.

TABLE 4.14

## POOL 10

<u>Cut</u>	<u>Primary Alternatives</u>
1. Upper Approach to L/D 10	10.02; 10.33; 10.03
2. McMillan Island	10.04; 10.18
3. Wyalusing	10.01; 10.24
4. Wyalusing Bend Light	10.01; 10.20; 10.24
5. McGregor	10.01; 10.09; 10.21; 10.41
6. East Channel	10.09
7. Mississippi Gardens	10.09; 10.30; 10.40
8. Jackson Island	10.09; 10.14; 10.15; 10.40
9. Hay Point	10.09; 10.16; 10.23; 10.40
10. Lower Approach to L/D 9	10.09; 10.17

Impacts of Site Use10.02 (EQ) - Selected Site for Cut 1

- a. No appreciable fish and wildlife impacts.
- b. No water quality impacts.
- c. No floodplain impacts.
- d. No recreation impacts.
- e. Moderate potential for cultural resource impacts; survey required before use.
- f. Potential noise and disturbance to area residents from truck traffic to the disposal area.
- g. Material removed for beneficial use.

10.03 - Secondary Site for Cut 1

- a. Minimal impacts on fish and wildlife.
- b. No water quality impacts.
- c. No floodplain impacts.
- d. No appreciable social impacts.
- e. Low potential for cultural resources; survey required before use.
- f. Potential noise and disturbance impacts on local residential areas. Truck traffic through Guttenburg would increase during periods when material is hauled to the site from the river.
- g. Material available for beneficial use.

10.33 (NED)

- a. Loss of 4 acres of main channel border habitat.
- b. Water quality impacts expected to be moderate. State standards for turbidity would be violated.
- c. Potential adverse floodplain impacts.
- d. Beneficial recreation impacts from creation of an open sandy island.
- e. No cultural resource impacts.
- f. No appreciable social impacts.



10.04 (EQ) - Selected Site for Cut 2

- a. Loss of 8 acres Type 4-5 wetlands in a sand and gravel pit. Rehandling of material to reach the site would adversely impact a small area of shallow aquatic habitat.
- b. No water quality impacts at the site. Minor water quality impacts during rehandling with violation of State turbidity standards.
- c. Potential adverse floodplain impacts.
- d. No recreation impacts.
- e. No cultural resource impacts.
- f. Elimination of local hazard of standing water in a gravel pit near a residential area.

10.18 (NED)

- a. Loss of 6 acres of bottomland hardwoods and 3 acres of Type 3-4 marsh. Failure of erosion control would impact on adjacent Type 4 deep marsh habitat.
- b. Water quality impacts expected to be temporary and minor. Size of site would make it difficult to meet State effluent standards.
- c. Adverse floodplain impacts.
- d. No recreation impacts.
- e. No cultural resource impacts.
- f. No appreciable social impacts.

10.01 (EQ, NED) - Selected Site for Cuts 3-4

- a. No appreciable impacts on fish and wildlife.
- b. No water quality impacts.
- c. No floodplain impacts.
- d. No recreation impacts.
- e. Moderate potential for cultural resource impacts; survey required before use.
- f. No appreciable social impacts.
- g. Material removed for beneficial use.

10.24

- a. No appreciable fish and wildlife impacts.
- b. No water quality impacts.
- c. No floodplain impacts.
- d. No recreation impacts.
- e. No cultural resource impacts.
- f. No appreciable social impacts.

10.20 (NED)

- a. Loss of 5 acres of Type 1 bottomland hardwoods and 1 acre of Type 3 shallow marsh. Failure of erosion control would impact on back-water sloughs, side channels, and riprap.
- b. Water quality impacts expected to be temporary and minor. Size of site would make it difficult to meet State effluent standards.
- c. Adverse floodplain impacts.
- d. No recreation impacts.
- e. No cultural resource impacts.
- f. No appreciable social impacts.

10.09 (EQ, NED)

- a. No appreciable fish and wildlife impacts from habitat loss. This old disposal site contains remnants of the endangered mussel Lampsilis higginsii and thus is of scientific value which would be lost if covered by new material.
- b. Water quality impacts expected to be temporary and minor. Size of site would make it difficult to meet State effluent standards.
- c. Adverse floodplain impacts.
- d. No recreation impacts.
- e. Adverse impacts upon a site (St. Friole Island) eligible for inclusion in the National Register of Historic Places.
- f. Potential noise and disturbance impacts on local residents.
- g. Material available for beneficial use.

10.21 (NED)

- a. Loss of 5 acres of Type 1 bottomland hardwoods and 1 acre Type 3 marsh. Continued use of the site or failure of erosion control would impact on main channel border and Type 4 deep marsh habitat.
- b. Water quality impacts expected to be temporary and minor. Size of site would make it difficult to meet State effluent standards.
- c. Adverse floodplain impacts.
- d. No recreation impacts.
- e. No cultural resource impacts.
- f. No appreciable social impacts.

10.41 - Selected Site for Cut 5

- a. Loss of 5 acres of Type 1 wet meadow habitat. Failure of erosion control would impact on Bloody Run Creek.
- b. No appreciable water quality impacts.
- c. No floodplain impacts.
- d. No recreation impacts.
- e. Moderate potential for cultural resource impact; survey required before use.
- f. No appreciable social impact.
- g. Material available for beneficial use.

10.30 (NED)

- a. Loss of 10 acres of Type 1 bottomland hardwoods and 5 acres of Type 3-4 deep marsh. Failure of erosion control would impact on main channel border habitat.
- b. Water quality impacts anticipated to be temporary and minor.
- c. Adverse floodplain impacts.
- d. No recreation impacts.
- e. No cultural resource impacts.
- f. Potential noise and disturbance impacts on nearby residential development.
- g. Material available for beneficial use.

10.40 (EQ) - Selected Site for Cuts 7-8; Secondary Site for Cuts 9-10

- a. No appreciable fish and wildlife impacts at the site. Adverse impacts on bottomland hardwoods in providing access to the site from the river.
- b. No water quality impacts.
- c. Potential adverse floodplain impacts.
- d. No recreation impacts.
- e. Moderate potential for cultural resource impacts; survey required before use.
- f. Loss of agricultural production.
- g. Material removed for beneficial use.

10.14 (NED)

- a. Loss of 16 acres of Type 1 bottomland hardwoods. Failure of erosion control would impact on wing dams, riprap, and a small creek. Access to the site from the river would impact upon additional bottomland hardwood habitat.
- b. Water quality impacts expected to be minor.
- c. Potential adverse floodplain impacts.
- d. No recreation impacts.
- e. Adverse impacts on known cultural resources at the site.
- f. No appreciable social impacts.
- g. Material removed for beneficial use.

10.15

- a. Minimal impacts upon fish and wildlife on the site. Rehandling material in the water at this site could impact on mussel beds.
- b. No appreciable water quality impacts.
- c. Potential adverse floodplain impacts.
- d. No recreation impacts.
- e. No cultural resource impacts.
- f. No appreciable social impacts.

10.16 (NED) - Selected Site for Cut 9

- a. Loss of 6 acres of Type 1 bottomland hardwoods. Failure of erosion control would impact on an adjacent backwater lake and downstream rip-rap and wing dam habitat.
- b. Water quality impacts expected to be moderate. Size of site would make it unlikely that State effluent standards could be met.
- c. Potential adverse floodplain impacts.
- d. Beneficial recreation impacts from creation of open sandy area adjacent to river.
- e. Moderate potential for cultural resource impacts; survey required before use.
- f. No appreciable social impacts.
- g. Material available for beneficial use.

10.23 (NED)

- a. Disturbance of 8 acres of revegetating old disposal site. Failure of erosion control would impact on a backwater lake, wing dams and rip-rap habitat.
- b. Water quality impacts expected to be moderate. Size of site would make it unlikely that State effluent standards could be met.
- c. Adverse floodplain impacts.
- d. No recreation impacts.
- e. No cultural resource impacts.
- f. No appreciable social impacts.

10.17 (NED) - Selected Site for Cut 10

- a. Loss of 4 acres of Type 1 bottomland hardwoods. Failure of erosion control would impact on Type 4-5 deep open marsh and wing dams.
- b. Water quality impacts expected to be temporary and minor.
- c. Potential adverse floodplain impacts.
- d. No recreation impacts.
- e. Moderate potential for cultural resource impacts; survey required before use.
- f. No appreciable social impacts.
- g. Material removed for beneficial use.

10.22 - Recommended as Suitable for Temporary Disposal for Cut 8

- a. Loss of 20 acres of old disposal site habitat. Failure of erosion control would impact on bottomland hardwood and main channel border habitat.
- b. Water quality impacts expected to be temporary and minor.
- c. Potential adverse floodplain impacts.
- d. Beneficial recreation impacts from creation of open sandy area adjacent to river.
- e. Low potential for cultural resource impact; survey required before use.
- f. No appreciable social effects.

Summary of Site Selection - Pool 10

- 4.113 Sites 10.02 and 10.03 were selected over site 10.33 for Cut 1 because of lesser impacts associated with their use. Site 10.02 was selected as the primary site over 10.03 because of closer access from the river.
- 4.114 For Cut 2 site 10.04 was selected over site 10.18 because of lesser impacts. Site 10.01 is the recommended site for Cuts 3 and 4 because of the minimal impacts at this site and its considerable capacity. Site 10.24 is considered an acceptable rehandling site by GREAT because of the negligible impacts that would occur in using this site for that purpose.
- 4.115 Site 10.41 is the recommended site for Cut 5 because it is considerably closer to the dredge cut than 10.01, and has lesser impacts than would be associated with sites 10.09 and 10.21.
- 4.116 Dredge Cut 6 is the East Channel at Prairie du Chien, Wisconsin. Because the East Channel has a low volume of use by commercial traffic, a low dredging frequency, and one of the two viable populations known in the St. Paul District of the endangered Higgins' eye pearly mussel (Lampsilis higginsii), the GREAT I team believes that future decisions regarding dredging in the East Channel are beyond the scope of GREAT I and must ultimately be made by higher authorities. On this basis, the GREAT I team decided to make no recommendations for this dredge cut.
- 4.117 Site 10.40 is the recommended site for Cuts 7 and 8 because of lesser impacts than would occur at sites 10.09, 10.14, 10.15, or 10.30.
- 4.118 For Cuts 9 and 10 sites 10.16 and 10.17 are the respective recommended sites because they are within easy access of the dredge cuts, provide for beneficial use, and their use would have relatively minor impacts if proper controls are employed.

Cumulative Impacts of the Environmental Quality (EQ), National Economic Development (NED), and Selected Sites

4.119 Table 5 below summarizes the cumulative impacts of the GREAT I selected sites in comparison with the EQ and NED sites.

TABLE 5 CUMULATIVE IMPACTS OF EQ,  
NED, AND SELECTED DISPOSAL SITES

	<u>EQ</u>	<u>NED</u>	<u>SELECTED</u>
Wetlands Impacted: <sup>a</sup>			
Type 1-2	185 acres	730 acres	315 acres
Type 3-4-5	165 acres <sup>b</sup>	185 acres	245 acres <sup>c</sup>
Sites with endangered species impacts	1	2	0
Sites whose use would likely violate State water quality standards	9	50	16
Sites with potential adverse floodplain impacts	23	90	42
Sites with recreational enhancement	6	59	41
Sites with a high potential for adverse impacts on cultural resources	7	14	4
Sites with social impacts:			
Adverse	8	6	9
Beneficial	2	6	6
Sites where material would be available for beneficial use	38	35	49

a Wetland acres rounded to nearest 5.

b Includes 130 acres impacted by fish and wildlife enhancement projects.

c Includes 75 acres impacted by fish and wildlife enhancement project.

## CHANNEL MAINTENANCE RECOMMENDATIONS

### Channel Maintenance Action Items

#### Action Item 2 - Interim Guidelines

4.120 Recommendation - Until the Corps of Engineers can gear up for full implementation of the recommended material placement plan (anticipated 1986), interim guidelines for dredge material placement have been developed. The interim guidelines recommended are basically the procedures GREAT I used in recommending placement sites to the Corps of Engineers during the study. These guidelines are contained in Section 2, pages 20-22 of this document, Exhibit 5 of the Main Report, and in the Channel Maintenance Appendix .

4.121 Impact of Recommendation - The interim guidelines would insure that the impacts of channel maintenance operations, particularly dredged material disposal, are minimized to the extent possible, considering limitations of equipment, funding, property ownership, etc.

4.122 Impact of No Action - No action would entail the risk that lines of communication and coordination established during the GREAT I study could break down. Loss of coordination would likely result in increased impacts from dredging and disposal because of the loss of broad-based input into the decision-making process.

4.123 The risk of a breakdown in coordination is probably small because of regulatory requirements and the successes that this process has achieved in the past.

### Action Item 3

4.124 Recommendation - The Corps of Engineers should continue restoring and establishing main stem shoreline protection on a yearly basis following the priority list prepared by GREAT I (Dredging Requirements, Sediment and Erosion, and Fish and Wildlife Work Groups) until completion. In place of funding and equipment capability on an as-available basis only to perform these tasks, the specific authority and funding should be provided to the Corps to stabilize a minimum of 5 miles annually.

4.125 Impacts of Recommendation - Stabilizing shoreline would have the general impacts of (1) reducing sediment impacts to the river, which in turn reduces dredging requirements and sedimentation in the backwaters; (2) reducing the loss of land (public and private) and fish and wildlife habitat, and (3) creating rocky shoreline habitat that in most situations is beneficial to the fishery.

4.126 Riprap placement generally has only minor impacts during the construction phase. In certain situations it may have adverse impacts on recreationists from aesthetic degradation and from reduced or eliminated access to and from the river.

4.127 Impacts of No Action - The impact of no action would be continuation of shoreline erosion with its associated impacts of contributing to dredging requirements, contributing to backwater sedimentation, and the erosion of lands and habitats.

### Action Item 4

4.128 Recommendation - Average annual dredging quantities should be minimized through application of technically supported reduced-depth dredging and maintenance of minimum channel widths suitable for navigation consistent with the following guidelines:

a. Dredging depths in approaches to rigid structure should be determined by technically supported safety criteria.

b. Dredging depths at other locations should be determined based on potential for increase in frequency of dredging, impacts on the transportation industry, and the demand for dredged material in the area.

A literature search and necessary supplemental research should be conducted to document the impact of channel depth on required channel width to maintain navigational safety.

4.129 Impact of Recommendation - Minimizing dredging quantities would minimize the impact of disposal of dredged material. The effort to minimize dredging depth and subsequent disposal impacts would have to be weighed on a case-by-case basis against safety factors, the potential for increasing dredging frequency, and the demand for dredged material for beneficial use.

4.130 Impacts of No Action - The impacts of no action would be similar to those described above, as reduced-depth dredging has been practiced for the last several years and is likely to continue.



#### Action Item 5

4.131 Recommendation - The Corps of Engineers should request the necessary appropriations to purchase efficient dredging equipment to best accomplish all the objectives of the GREAT I channel maintenance plan. Until this equipment is available, the Corps should emphasize contract dredging to meet those objectives.

4.132 Impacts of Recommendation - Because this action is necessary for full implementation of the Dredged Material Placement Plan (DMPP), the impacts associated with it are those generic to the DMPP, i.e., reduced adverse impacts on fish and wildlife habitat, water quality, and the floodplain; increased benefits from beneficial use and recreation enhancement; and increases in the cost of maintaining the navigation channel.

4.133 Impacts of No Action - No action would mean that portions of the DMPP would not be readily implementable. Disposal sites would be selected by the Corps in consultation with the affected States and Federal agencies in those cases where equipment limitations would make use of the DMPP unfeasible. The impacts associated with it are those generic to the DMPP, i.e., reduced adverse impacts on fish and wildlife habitat, water quality, and the floodplain; increased benefits from beneficial use and recreation enhancement; and increases in the cost of maintaining the navigation channel.

#### Action Item 6

4.134 Recommendation - In every case where in-floodplain placement of dredged material is proposed, a quantitative analysis of the effects of that placement must be made. This analysis must include a computation of the effect of any encroachment into the floodway by assuming an equal degree of hydraulic encroachment on the other side of the river for significant hydraulic reach. Variances to State standards requiring an equal degree of encroachment should be considered where the Federal Government owns the land on both sides of the river within the significant hydraulic reach. Until a quantitative analysis is conducted, the following guidelines will be used:

a. Dredged material should be placed out of the floodplain of the Mississippi River and tributary streams.

b. In those cases where in-floodplain placement is proposed, the material should be placed in the flood fringe rather than the floodway or effective flow area.

c. Placement in the floodway or effective flow area may be conducted on a temporary basis and the material removed from the floodway before the seasonal high water in accordance with written agreements between the State or local floodplain regulatory agencies and affected landowners.

4.135 Impacts of Recommendation - In essence, this recommendation would provide an accurate account of the impacts of disposal on the floodplain, resulting in better and more reliable decisions on the disposal of dredged material. In the interim, the impacts of disposal on the floodplain would be minimized.

4.136 No Action - No action would result in the making of decisions on dredged material disposal without accurate information about its floodplain impacts.

#### Action Item 7

4.137 Recommendation - Whenever reasonable, material dredged during channel maintenance should be placed at areas accessible for removal for beneficial purposes. Where known demand for dredged material exists, stockpile sites should be established to maximize the economic and social benefits made possible by having sand available for beneficial uses. A process should be developed and approved by an interagency management committee to quickly identify and use new placement sites in order to satisfy new demands (either on a one-time or recurring basis) as they occur.

4.138 Impact of Recommendation - Maximizing beneficial use of dredged material would result in a reduction of the area required for permanent dredged material stockpiling, which in turn would reduce the amount of fish and wildlife habitat lost to disposal sites. Erosion impacts from long-term disposal sites would also be minimized. Development of a mechanism to incorporate and employ new beneficial uses would further reduce the impacts associated with long-term disposal sites. Emphasizing beneficial use of dredged material would also have beneficial, social, and economic impacts by providing a source of material for public road sanding, and fill for industrial developments.

4.139 Impacts of No Action - No action would entail not emphasizing beneficial use of dredged material, and limiting use of the material for beneficial purposes to occasions when a ready use is known. The result would be an increase in area needed for permanent stockpiles, which in turn would increase adverse impacts on fish and wildlife habitat from direct filling and erosion impacts.

### Action Item 3

4.140 Recommendation - Temporary material placement sites will be used when private or Government dredging capability to reach the GREAT I recommended channel maintenance plan sites is not expected to be available before dredging is required. These sites will also be considered for use in emergency dredging and imminent closure situations as defined by GREAT I. In the selection and use of temporary sites, the following criteria shall apply:

- a. Temporary sites approved by GREAT I are listed in the rationale.
- b. The annual notice will include a site plan for all temporary sites, showing material placement and removal plans and appearance of the site after its use.
- c. Material stockpiled at these sites will be removed by the following spring high water or as soon as possible under time and/or equipment limitations.
- d. Material removed will be taken to the channel maintenance plan approved sites.
- e. Temporary placement sites are not endorsed by GREAT unless the material is excavated before any additional material is placed. The additional amount placed is not to exceed the volume removed.

4.141 Impacts of Recommendation - The impact of this recommendation would be to minimize the impacts associated with the disposal of dredged material during emergency dredging situations or in instances where the DMPP site is not immediately available for use. The 22 sites considered acceptable by GREAT I are previously used disposal sites. The primary impact associated with their occasional use as temporary stockpile sites is that this occasional disturbance would set back the process of recovery of these sites to some level of biological productivity. This impact will vary from site to site, depending upon how long it has been since the last previous disposal there, and the size of the area needed for temporary use.

4.142 Impacts of No Action - The impact of no action would be continuance of an existing problem whereby lack of a predesignated disposal site for emergency dredging operations often leads to the use of sites with considerable adverse impact, only because of the lack of time to find a more acceptable site.

Action Item 9

4.143 Recommendation - Criteria for sediment and water quality as they relate to dredging and material placement should be developed by the Environmental Protection Agency in consultation with the appropriate State and Federal agencies. Using these criteria, the States should develop uniform regulations for the control of dredging and dredged material placement activities. In the interim, the following guidelines should be used to determine proper methods for dredged material placement.

a. An adequate bottom sediment data base at frequently dredged locations should be developed and maintained.

b. It should be determined if the material to be dredged is contaminated using 40 CFR 230, Interim Guidance for Section 404(b) of Public Law 92-500, Implementation Manual for Section 103 of Public Law 92-532, EPA's "Working Guidelines for Sediment Classification" (Great Lakes Criteria), and any other appropriate information in coordination with the affected States and agencies.

c. Contaminated dredged material shall be placed in an environmentally safe containment area.

d. Uncontaminated material shall be placed in accordance with the GREAT I channel maintenance plan. If the channel maintenance plan site cannot be used, an alternative site shall be selected in coordination with the affected States and agencies including using the On-Site Inspection Team process. Open-water placement or beach nourishment may be considered as an alternative.

e. Water quality during dredging and placement activities should be monitored whenever dredged material or supernatant is returned to the water. Treated effluents shall be monitored for total suspended solids, turbidity, and other appropriate parameters of concern. Open-water placement shall be monitored emphasizing the use of indicator parameters, water quality standard parameters, and toxic substance scans. Water quality and sediment monitoring programs should be coordinated among affected States and agencies.

f. Where contaminated material cannot be adequately contained, appropriate warnings to recreationists shall be posted for a distance of 2 miles downstream of the placement site. When contaminated materials are dredged, designated recreation areas within 1,000 feet downstream of the dredging operation should be posted.

4.144 Impacts of Recommendation - Developing sediment and water quality criteria and, subsequently, water quality regulations directly applicable to dredging and disposal operations, would insure that water quality is protected during these operations. The development of directly applicable regulations would simplify making management decisions that call for trade-offs between water quality and other resource values, e.g., island creation or beach nourishment projects using dredged material.

4.145 Use of the interim guidelines should have the effect of protecting water quality during dredging and disposal operations without having excessive impacts on other resource values. This use should achieve a balance in the decision-making processes on channel maintenance operations.

4.146 Impacts of No Action - No action would have the impact of continuing the present situation whereby decisions to protect water quality are based upon limited available data, evaluation procedures that are in many cases developmental, and on water quality regulations not specifically designed to deal with dredging and disposal operations. Decisions made on these bases are at times too conservative, relative to water quality, at the expense of other resource values. Two common examples are (1) containment areas are sometimes made excessively large in order to meet current water quality regulations that may be too stringent, resulting in unnecessary losses of fish and wildlife habitat; and (2) beach nourishment is not allowed because it technically violates water quality regulations and/or State laws, although the adverse impacts on water quality and the environment can be negligible, and beach nourishment may produce substantial recreational benefits.

4.147 Continuation of the present situation would result in continued confrontation between the Corps and regulatory agencies on water quality issues such as the applicability of existing regulations, the costs and procedures necessary to meet regulations, and the need to consider other resource values in the decision making processes.

#### Action Item 10

4.148 Recommendation - The Corps of Engineers should prepare and implement, after appropriate interagency evaluation, site development plans for all historic and proposed dredged material placement sites. The following guidelines should be used for preparation of the plans:

1. Use landscape architecture skills.
2. Prepare plans before on-site inspection team meetings.
3. Identify proposed uses and management.
4. Consider equipment availability and mobilization.
5. Consider needs for revegetation.
6. Consider needs for erosion control.

4.149 Impact of Recommendation - Developing site plans for past and future disposal sites would insure that sites are properly designed and managed to maximize the recreation and fish and wildlife potential of the sites and to minimize the adverse impacts associated with their use as disposal sites.

4.150 Impacts of No Action - No action would continue the practice of using historic disposal sites for disposal, with no long-term plans for the sites and little or no followup measures to mitigate impacts at the sites. No work would be done to stabilize the material to prevent erosion, and no work would be done to enhance the recreational and/or fish and wildlife qualities of the sites.

#### Action Item 11

4.151 Recommendation - Bank stabilization and establishment of sediment traps above the Burlington Northern bridge have been identified as viable alternatives for sediment control on the Chippewa River and should be further evaluated and implemented as soon as possible.

4.152 Impact of Recommendation - Further studies would have no environmental impacts. Implementation would reduce sediment input to the Mississippi River from the Chippewa River, which in turn should reduce dredging requirements on the Mississippi, especially in Lower Pool 4 and Pools 5 and 5A. Reducing dredging requirements would reduce the associated impacts and costs.

4.153 The construction of sediment traps would have some environmental impacts, especially during the processes of construction, removal of sediment from the traps, and disposal of this material. These impacts would have to be weighed against the potential benefits at the time the traps are proposed for use.

4.154 Impacts of No Action - No action would have no direct impact. However, an opportunity would be lost to develop possible acceptable methods of reducing dredging requirements, impacts, and costs on the Mississippi River.

#### Cumulative Impact of Channel Maintenance Action Recommendations

4.155 The cumulative impact of these recommendations should be a reduction in the adverse impacts associated with dredged material disposal while providing for safe navigation. This would be accomplished through the Dredged Material Placement Plan (DMPP) (Action Item 1) as well as through other measures such as reducing volume of material dredged, using more efficient equipment, following guidelines designed to protect environmental quality, and planning disposal sites to minimize impacts and to enhance site recovery and resource values.

4.156 Table 5 summarizes the cumulative impacts of the DMPP. Some of the other action recommendations need to be implemented to make the DMPP workable such as Action Items 3 and 4; while others may reduce impacts below those of the DMPP, such as Action Items 7 and 10.

Channel Maintenance Policy/Funding Items

Policy/Funding Item 1

4.157 Recommendation - Congress should continue to authorize the maintenance of the navigation channel to meet current and future needs of commercial navigation consistent with other resource requirements.

4.158 Impacts of Recommendation - This recommendation should have no impact because there are no indications that Congress would ever curtail maintenance of the navigation channel, considering the channel's economic importance to the Upper Midwest and the Nation.

4.159 Impacts of No Action - No impacts would be associated with no action. All indications are that Congress will continue to authorize maintenance of the 9-foot navigation project.

Policy/Funding Item 2

4.160 Recommendation - The necessary funding and personnel should be provided to the Corps of Engineers for preparation of long-term plans to implement the GREAT I channel maintenance plan. These long-term plans should include scheduling of necessary interagency coordination, permit applications, and land acquisition. Additional specific coordinating activities should be initiated when it becomes apparent that dredging will be required during the dredging season.

4.161 Impact of Recommendation - The process of implementing the channel maintenance plan would be accelerated.

4.162 Impact of No Action - Coordination and planning for implementation of the channel maintenance plan would proceed at a pace relative to the availability of funds, which can vary, but are currently very limited.

### Policy/Funding Item 3

4.163 Recommendation - Emergency dredging should be defined as dredging required to free a grounded vessel or remove shoals in the channel as a result of a vessel freeing itself. The emergency will continue only until an adequate channel depth and width, as determined by the Corps of Engineers, is restored to allow vessel passage.

Imminent closure should be defined as:

a. The actual water depth is projected by the District Engineer to be 10 feet or less within 14 days or less.

b. The channel width is less than 85 percent of the normally maintained width.

4.164 Impact of Recommendation - Standardization of the definition of emergency dredging would insure that the needs of commercial transportation are met, in terms of maintaining an open channel while at the same time minimizing the occurrences of emergency dredging and thereby lessening the associated impacts.

4.165 Impact of No Action - Lack of formal definition would result in controversy over this issue, and fluctuations in agency policies. Increases would occur in a number of events, such as dredging under emergency guidelines when no emergency exists, or the forestalling of dredging until an actual channel closure results. Unnecessary impacts would result in the one instance, and the endangerment of life and property in the other; both instances could increase the conflicts on the river between management agencies and between different groups of river users.

### Policy/Funding Item 4

4.166 Recommendation - The Corps of Engineers should maintain sufficient dredging capability in the St. Paul District to perform emergency and national defense dredging.

4.167 Impacts of Recommendation - Commercial navigation would benefit because a quick response to channel closure would be assured and costs to commercial transportation interests that result when traffic is delayed by channel closures would be minimized.

4.168 Impacts of No Action - With no action the St. Paul District would have to rely on contract dredging or equipment from other Corps Districts to perform emergency dredging. In general, the result would be slower response time to emergency dredging needs, increased costs to commercial transportation interests, and potentially increased dangers to human life and property during groundings.



Policy/Funding Item 5

4.169 Recommendation - The Corps of Engineers should attempt to sell dredged material to sand and gravel companies.

4.170 Impact of Recommendation - This recommendation is likely to have no impacts. History indicates that the Corps has been unable to give dredged material away in many cases; sale of the material is unlikely.

4.171 Impact of No Action - No action would have no impact.

Policy/Funding Item 6

4.172 Recommendation - The Corps of Engineers should change its policy and allow acquisition of private lands for stockpiling of dredged material to implement the channel maintenance plan and make material available for beneficial use.

4.173 Impact of Recommendation - Implementation would have substantial beneficial impacts. Current policy requires disposal on Federal property if a private property owner does not give permission for use of his property. Since most Federal property on the river is wetlands in the river floodplain, disposal there can have substantial adverse impact. Also, sites on Federal land tend to be inaccessible, thus making the dredged material unavailable for beneficial use.

4.174 If the Corps could purchase private property for use, sites could be developed where use would have minimal adverse effect and also make material available for beneficial use. Many DMPP sites are on private land; therefore implementation of this recommendation is important to the implementation of the DMPP.

4.175 Impact of No Action - With no action, Federal lands would still have to be used for substantial amounts of dredged material disposal. The result would be substantial impacts upon the fish and wildlife habitat along with impacts on water quality and the floodplain because most of the Federal lands are wetlands and are in the floodplain.

4.176 To some degree, the DMPP would not be implemented, because 50 percent of the sites in the DMPP are on private property that must be purchased or leased to ensure availability over the long term.

#### Policy/Funding Item 7

4.177 Recommendation - State and Federal agencies should modify their laws and requirements to allow creation and maintenance of interagency recommended recreation and fish and wildlife enhancement within the floodplain and implementation of the channel maintenance plan.

4.178 Impacts of Recommendation - The impact of this recommendation would be to allow implementation of fish and wildlife and recreation enhancement projects and portions of the GREAT I dredged material placement plan that currently would violate Federal and State laws, regulations, and policies on water quality and the floodplain, even though the adverse impacts of these projects are very minor.

4.179 This recommendation would provide for better management of the river resources through habitat improvement and protection, and the provision of recreational opportunities to satisfy public needs.

4.180 There may be some question as to the appropriateness of modifying environmental regulations to allow the granting of variances to State and Federal agencies and not to the private sector. This question would have to be considered during the review process associated with any regulatory changes.

4.181 Impact of No Action - No action would result in the non-implementation of portions of the GREAT I dredged material placement plan and certain fish and wildlife and recreation enhancement projects. In those instances where a DMPP site could not be used because of regulatory restrictions, an alternate site would have to be selected through established coordination procedures between the Corps and State and Federal agencies. Without the enhancement projects, opportunities to enhance the fish and wildlife and recreational resources on the river would be lost.

#### Policy/Funding Item 8

4.182 Recommendation - Congress should define the Mississippi River 9-foot navigation project as that necessary to afford safe navigation for vessels with a draft of no greater than 9 feet.

4.183 Impact of Recommendation - Implementation of this recommendation would help to eliminate controversy surrounding dredging depths that arise with most dredging jobs. The depth of dredging can have great impact upon the environment and the economics of commercial transportation. The establishment of a firm definition would make the decision-making process more balanced for all interests on the river. This particular recommendation should eliminate instances of excessive dredging and the attendant adverse impacts from disposal of the excess material while insuring to a reasonable degree the continuance of safe and efficient navigation.

4.184 Impact of No Action - No action would result in the continuation of controversy over dredging depths. Such controversy leads to excessive administrative costs to the State and Federal Governments.

Cumulative Impact of Channel Maintenance Policy/Funding Recommendations

4.185 The cumulative impact of this set of recommendations should be a reduction of conflict associated with maintenance of the navigation channel: implementation of these recommendations would define and clarify areas open to different interpretation, such as what constitutes emergency dredging, the authority of the Corps to accomplish resource enhancement, the definition of the 9-foot channel, etc. Agreement on these matters would allow more positive management efforts. The resource and the public good are the ultimate losers if management agencies spend time and effort disputing policies.

4.186 In addition, some of these recommendations are necessary for full implementation of the DMPP because implementation of these would provide funding and authority to acquire non-Federal lands necessary for disposal.

## Channel Maintenance Further Study Items

### Further Study Item 1

4.187 Recommendation - A demonstration dredging project should be conducted during 1980 or 1981 by the St. Paul and Rock Island Districts of the Corps of Engineers to determine the feasibility and cost effectiveness of accomplishing channel maintenance by:

1. Mechanical dredging with a backhoe directly loading onto barges.
2. Hydraulic dredging with direct loading onto barges.
3. Mechanical unloading at material placement sites.
4. Hydraulic unloading at material placement sites.

4.188 Impact of Recommendation - The demonstration project would have some typical impacts of dredging and disposal operations which would have to be considered in the development of the project, to minimize impacts. The overall impact of the project would probably be to provide information on dredging equipment to determine which types can do the job in the most economical and environmentally acceptable manner. In the long term, this could result in a reduction in the impacts associated with channel maintenance operations.

4.189 Impact of No Action - No action would have no direct impact. An opportunity would be lost to develop information on dredging equipment that could potentially reduce the impacts associated with channel maintenance operations.

### Further Study Item 2

4.190 Recommendation - A plan should be developed to use the river's sediment transport capability to cause necessary dredging requirements to occur near long-term placement sites as environmentally and economically feasible.

4.191 Impact of Recommendation - Implementation would have the impact of reducing disposal site requirements, which in turn will reduce the impacts of disposal. Also, the availability of material for beneficial use would increase, which could result in beneficial economic impacts.

4.192 Impact of No Action - No action would have no direct impacts. However, an opportunity would be lost to develop techniques and methods to reduce the impacts of disposal and increase beneficial uses of dredged material.

### Further Study Item 3

4.193 Recommendation - The Corps of Engineers should continue to develop computerized sediment transport models of the Mississippi River 9-foot navigation system. As models become operations, they should be used to determine optimum depth for dredging at each dredge cut, possible changes in the wing dam system, and other means for reducing dredging requirements

4.194 Impact of Recommendation - Implementation would increase the level of available knowledge concerning sediment transport and would result in better management decisions relative to dredging requirements on the river.

4.195 Impacts of No Action - No action would have no direct impact. An opportunity would be lost to develop information that would enable better management decisions relative to dredging on the river.

### Further Study Item 4

4.196 Recommendation - The Corps of Engineers should initiate dredging at dredge sites below the confluence of major bed load supplying tributaries when the technical relationships indicate a high risk of potential channel closure. The Corps of Engineers should monitor the deltas at the confluence of such tributaries to determine the technical relationships of delta conditions, hydrologic occurrences, and risk to downstream channel conditions. The relationships should be applied to determine dredging activities. When a high risk of potential channel closure is determined to exist, dredging should be accomplished with full consideration of the environmental impacts of the dredging and material placement.

4.197 Impacts of Recommendation - Implementation would reduce the risk of having to perform emergency dredging, and would allow dredging to occur at specific locations where disposal sites can be more easily designated, in a manner that would minimize associated impacts.

4.198 Impacts of No Action - No action would have no direct impacts. The opportunity to develop techniques to reduce emergency dredging and the impacts associated with it would be lost.

### Further Study Item 5

4.199 Recommendation - The condition of all wing dams and closing dams at all historic dredging sites in the St. Paul District should be identified to determine the need for repair and/or modification.

4.200 Impacts of Recommendation - Conducting the investigation would have no impacts. Modifying or repairing wing dams would have beneficial impacts by reducing dredging requirements and for costs. This fish and wildlife habitat value of wing dam may improve or lessen with modification, depending upon the individual wing dam. Temporary minor adverse water quality impacts are likely to result from turbidity and suspended solids associated with some modifications.

4.201 Impacts of No Action - No action would have no direct impact. The opportunity would be lost to gather information that could lead to wing dam modification and thereby reduce dredging requirements and/or costs.

#### Further Study Item 6

4.202 Recommendation - To reduce dredging requirements, operation of main stem dams or construction of low-head tributary dams to create a more favorable Mississippi River stage in relation to tributary stages should be investigated.

4.203 Impacts of Recommendation - Conducting the investigation would have no impacts. If the suggested dams proved feasible and environmentally acceptable, the amount of dredging, as well as the impacts associated with dredging and disposal necessary on the river, could be reduced.

4.204 Impacts of No Action - No action would have no direct impacts, but an opportunity to develop methods to reduce dredging requirements and impacts would be lost.

#### Further Study Item 7

4.205 Recommendation - The Corps of Engineers should investigate the possibility of sand and gravel companies accomplishing the dredging required for channel maintenance.

4.206 Impacts of Recommendation - The investigation would have no impacts. If successful, the long-term impacts could prove very beneficial in terms of reducing the impacts of dredged material disposal and providing for beneficial use of the dredged material.

4.207 Impacts of No Action - No action would have no direct impacts. However, an opportunity to accomplish a reduction in dredged material disposal impacts while increasing the beneficial use of dredge material that would be lost.

#### Further Study Item 8

4.208 Recommendation - The Corps of Engineers should continue monitoring dredging and material placement activities to further determine impacts on water quality. Parameters tested, as agreed to by an interagency coordinating committee, should be used in correlation with the existing knowledge base and with site-specific sediment and hydraulic characteristics to develop a predictive capability of water quality impacts related to dredging and material placement. When such predictive capability is established, water quality criteria and standards should be reviewed and revised.

4.209 Impact of Recommendation - Implementation would increase the level of knowledge concerning the water quality impact of dredging and disposal, resulting in better management decisions.

4.210 Impact of No Action - No action would have no direct impacts. An opportunity would be lost to develop information that would be used to make better management decisions on dredging and disposal operations.

#### Further Study Item 9

4.211 Recommendation - A follow-up to the Corps of Engineers "Streambank Erosion Site Inventory" should be conducted cooperatively between the Soil Conservation Service and the Corps of Engineers to determine and classify streambank erosion sites not previously identified. Alternatives for bank erosion control should be developed and analyzed for economic and environmental impacts. Implementation authority and cost-sharing criteria should be developed so that control alternatives can be implemented.

4.212 Impacts of Recommendation - The ultimate impact of such a program would be the lessening of erosion of coarse sediments from streambanks, with a subsequent reduction in the need for dredging on the Mississippi River. This in turn would reduce the impacts associated with dredging and disposal operations. Individual projects in many cases will improve local fishery habitat. Temporary minor adverse water quality impacts are generally associated with bank stabilization projects.

4.213 Impacts of No Action - Streambank erosion problems would continue at various locations on the Mississippi River and its tributaries. Failure to control this erosion would allow coarse sediments to continue to contribute to the channel maintenance problems on the Mississippi River and the impacts associated with channel maintenance operations.

#### Further Study Item 10

4.214 Recommendation - Bedload sediment entrapment structures (rock gabions, lowhead dams, etc.) should be constructed on lower reaches of intermittent or seasonally dry tributaries on the Wisconsin side of Pool 3.

4.215 Impacts of Recommendation - Conducting studies in this area would have no impact. If solutions are implemented, they would reduce sediment input into the Mississippi River, which in turn should reduce the need for dredging and the associated impacts.

4.216 The impacts of disturbance during installation of structural measures are not anticipated to be significant. Further evaluations would be necessary when specific actions are proposed.

4.217 Impacts of No Action - The no action alternative would have no direct impacts. However, an opportunity would be lost to potentially develop solutions to alleviate some of the high volume dredging requirements in Pool 3.

#### Further Study Item 11

4.218 Recommendation - Riverine disposal should be investigated where beneficial uses are unavailable and secondary environmental impacts of riverine placement are less than impacts at alternate placement sites. The investigations should be carried out at no more than two sites and should be subject to the approval of the affected States. Environmental impact conclusions should be considered site specific unless proven otherwise.

4.219 Impacts of Recommendation - Conducting this investigation is likely to have minor adverse impacts on water quality and potentially adverse impacts on aquatic habitat. If riverine disposal proved acceptable, beneficial impacts could result from the reduction of disposal impacts on other habitats.

4.220 Impacts of No Action - No impacts would result from no action. However, the opportunity would be lost to develop disposal techniques with potentially less impacts than traditional disposal methods.

#### Further Study Item 12

4.221 Recommendation - The feasibility of removing material from existing placement sites in the floodway, where there is potential for flood flow impacts, should be investigated.

4.222 Impacts of Recommendation - Conducting the investigation would have no impacts. If removing the material were proven feasible, beneficial impacts would result from reducing the flood-flow impacts of some existing disposal sites, thereby reducing the impacts of erosion of material from these sites on fish and wildlife habitat, and from the potential improvement of the biological productivity of old disposal sites.

4.223 Impact of No Action - No direct impacts would be associated with no action. However, the opportunity would be lost to potentially achieve the beneficial impacts described in the paragraph above.

#### Further Study Item 13

4.224 Recommendation - When the need for transporting dredged material to an area of high demand has been identified at a specific site, a feasibility study should be made to determine the best means of providing the desired material. Sources to be considered for the material should include historic placement sites as well as proposed dredging operations. All potential methods of moving the material should be considered including rail, truck, pipeline, and barge. Such studies will involve an environmental assessment of impacts.

4.225 Impact of Recommendation - Conducting the various studies would have little or no impact. The long-term result should be a reduction in disposal impacts and an increase in beneficial use of dredged material.

4.226 Impact of No Action - No action would have no direct impacts. An opportunity would be lost to develop methods that would reduce disposal impacts and increase beneficial use of dredged material.



#### Further Study Item 14

4.227 Recommendation - Private enterprise should be encouraged to explore the economic feasibility of transporting sand from dredged material islands to the area of demand.

4.228 Impact of Recommendation - This recommendation would probably have no impacts. If transporting dredged material to areas of demand were to become economically feasible, private enterprise would need no encouragement to make a profit.

4.229 Impacts of No Action - No action would have no impact.

#### Further Study Item 15

4.230 Recommendation - The feasibility of using riprap made with dredged material and cement should be investigated.

4.231 Impact of Recommendation - No environmental impacts would result from conducting this study. If making riprap from dredged material proved feasible, beneficial impacts would result from the beneficial use of the material and an associated reduction in disposal impacts.

4.232 Impacts of No Action - No impacts would be associated with no action. However, a potential opportunity to discover a use for dredged material, with the benefits discussed above, would be lost.

#### Further Study Item 16

4.233 Recommendation - The potential beneficial uses of fine organic sediments should be studied. The study should address the problems of contaminants and dewatering, often associated with fine organic material, and the possible effects dredging may have on biological productivity at the dredging sites.

4.234 Impact of Recommendation - Little impact would result from conducting such a study. If uses of fine sediments proved feasible, impacts would result from the beneficial use of fine sediments and from a reduction in the impacts associated with disposal of this material.

4.235 No Action - No direct impacts would be associated with no action. However, the potential opportunity to develop beneficial uses of fine dredged material and reduce the impacts of disposal of this material would be lost.

#### Cumulative Impact of Channel Maintenance Further Study Recommendations

4.236 The cumulative impact of these studies should eventually lead to further reductions in the impacts of dredged material disposal. These studies should result in methods to reduce further dredging needs, to cause dredging to occur where the material can be used for beneficial use, and to promote increased beneficial use of dredged material.

## SEDIMENT AND EROSION CONTROL RECOMMENDATIONS

### Sediment and Erosion Control Action Items

#### Action Item 12

4.237 Recommendation - Application of soil erosion control practices and/or best management practices for nonpoint sources should be increased in the critical sediment source area of the Mississippi River to the extent possible, through the use of programs administered by the U.S. Department of Agriculture (Soil Conservation Service and Agricultural Stabilization and Conservation Service) and similar State programs. Congress and the State legislatures should continue support of ongoing programs. The Rural Clean Water Program should be extended and funded to the level previously authorized (\$400,000,000 per year).

4.238 Impacts of Recommendation - Acceleration of existing land treatment and erosion control techniques would reduce upland erosion in the critical sediment source area and reduce the rate of sedimentation in the backwaters of the Mississippi River. Currently, 46 percent of the land in the critical source area is adequately protected. Increasing this to approximately 80 percent (the maximum believed possible) would reduce upland erosion by about one-third. There are no estimates of the degree to which this sedimentation in the backwaters would be reduced. It seems reasonable to assume that it should extend the ecological life of these areas, but the possible length of extended life is not known. Additional benefits would accrue to the agricultural community from the reduction of erosion on approximately 1.45 million acres of cropland.

4.239 Impacts of No Action - No action would entail not increasing soil erosion efforts in the critical sediment source area of the Mississippi River. This would have the effect of allowing the backwater areas of the Mississippi River to fill in with fine sediments and to age ecologically at approximately the current rate. It is projected that the ecological life of these areas at this rate is 50 to 250 years, depending upon location.

## Sediment and Erosion Control Further Study Items

### Further Study Item 17

4.240 Recommendation - A concurrent two-part program should be conducted in the GREAT I critical sediment source area to determine the feasibility of large-scale use of conservation tillage farming systems to reduce the sediment yield to the Mississippi River.

4.241 Impacts of Recommendation - Conducting feasibility studies would have negligible impacts. If conservation tillage on a large scale proves feasible, significant impacts could occur in the critical sediment source area and on the Mississippi River.

4.242 If shown feasible, this type of farming practice could have impacts on the nature of farm operation and economics, and possibly major impacts on soil erosion control. On the Mississippi River, the benefits would be realized primarily in the backwaters. Estimates on the ecological life of the backwaters range from 50 to 250 years. Any improvements in soil erosion control techniques should extend the life of these highly productive areas. No estimates are available as to how long the life of the backwaters could be extended. The feasibility studies would provide data for such estimates.

4.243 Impacts of No Action - No direct impacts would result from no action. However, an opportunity to develop soil erosion control techniques that could extend the ecological life of the Mississippi River backwater areas would be lost.

### Further Study Item 18

4.244 Recommendation - Monitoring of sediment inflow from major tributaries should be continued and additional stations established. The Corps of Engineers should review all tributaries with a coordinating committee to establish priorities for additional sediment sampling stations.

4.245 Impacts of Recommendation - No appreciable environmental impacts would be associated with the monitoring program. The data collected would be useful in making decisions that may reduce future impacts associated with channel maintenance.

4.246 Impacts of No Action - No impacts would be associated with non-implementation of this recommendation.

### Cumulative Impact of Sediment and Erosion Control Recommendations

4.247 The cumulative impact of the sediment and erosion control recommendations should be a reduction in sediment inflow into the Upper Mississippi River from upland sources. This reduction in turn would slow the rate of filling the navigation pools, especially the backwater areas, extending their ecological life past current projections. Because of the broad nature of the problem of erosion and sedimentation and the large scale of the proposed solutions, it is impossible to predict the effectiveness of such programs.

4.248 An added benefit would be the positive long-term impact that erosion control should have upon agriculture.

## WATER QUALITY RECOMMENDATIONS

### Water Quality Action Items

#### Action Item 13

4.249 Recommendation - The Environmental Protection Agency should maintain a list of all substances that would significantly threaten the riverine environment if a spill occurred. The U.S. Coast Guard should continue to develop and enforce regulations on the shipment of hazardous materials including prohibitions, where necessary.

4.250 Impacts of Recommendation - Implementation of this recommendation would reduce the potential for hazardous material spills in the river and the impacts associated with those spills.

4.251 Impacts of No Action - Non-regulation of the shipment of hazardous materials increases the chances of a spill on the river. Depending on the nature of the material, substantial impacts would occur to water quality, fish and wildlife, and the recreational quality of the river.

#### Action Item 14

4.252 Recommendation - Sanitary pump-outs and trash pickup points should be established in suitable areas.

4.253 Impacts of Recommendation - Implementation would have beneficial impacts upon water quality and aesthetics by reducing the amount of sanitary wastes and trash dumped in the river by boaters.

4.254 Impacts of No Action - No action would have no direct environmental impact. However, the opportunity to improve conditions on the river, relative to indiscriminate waste disposal by boaters, would be lost.

### Cumulative Impact of Water Quality Recommendations

4.255 The cumulative impact of the water quality recommendations would be to reduce the probability of adverse water quality impacts resulting from hazardous material shipments and recreational boater activities. Until regulations are developed or the feasibility of individual pumpout facilities is explored, it is not possible to make any quantitative predictions of cumulative impact.

## FISH AND WILDLIFE RECOMMENDATIONS

### Fish and Wildlife Action Items

#### Action Item 15

4.256 Recommendation - Each State and Federal agency contributing to the natural resource management of the Upper Mississippi River should place more emphasis on the river by increasing staff and budget allocations to the work on the fish and wildlife resources of the river.

4.257 Impact of Recommendation - Implementation would prove beneficial to the fish and wildlife resources of the river by providing funding for increased management efforts.

4.258 Impact of No Action - No action would maintain a situation which limits funding levels for fish and wildlife management efforts on the river at a time when the demands upon the resource are increasing but the quality of the resource base is decreasing.

#### Action Item 16

4.259 Recommendation - Gate culverts should be placed at the dike of Lock and Dam 4.

4.260 Impacts of Recommendation - Below the Lock and Dam 4 dike are a number of backwater lakes which had their inflows cut off by construction of the dike. These lakes suffer from chronic oxygen depletion in the winter which limits their value for overwintering fish. Installation of culverts in the ditch would provide freshwater flows to these lakes and solve the oxygen depletion problem, and thereby improve the habitat value of these lakes.

4.261 Impact of No Action - The lakes would continue to suffer oxygen depletion problems and have limited value as overwintering habitat for fish.

#### Action Item 17

4.262 Recommendation - A gated culvert should be constructed through the dike of Lock and Dam 10 to provide a water supply to the waterfowl in Pool 11.

4.263 Impacts of Recommendation - Freshwater flows would be provided to a series of old fish ponds, improving their value as waterfowl habitat.

4.264 Impacts of No Action - No impacts would result from non-implementation, but an opportunity to improve the habitat value of these ponds would be lost

Action Item 18

4.265 Recommendation - The U.S. Fish and Wildlife Service should continue to upgrade and expand facilities of the Upper Mississippi River Wildlife and Fish Refuge under the Bicentennial Land Heritage Program and other potential funding sources.

4.266 Impacts of Recommendation - Expansion of facilities under this program would increase recreational opportunities on the river. Depending upon the nature of the facility, there could be some adverse impacts upon fish and wildlife from lost habitat and increased human activity in an area.

4.267 Impacts of No Action - No action would have no environmental impacts.

Cumulative Impacts of Fish and Wildlife Action Recommendations

4.268 This particular set of recommendations would not have any appreciable cumulative effect. The culverts at Lock and Dam 4 and Lock and Dam 10 would enhance approximately 150 to 200 acres of fish and wildlife habitat.

Fish and Wildlife Policy/Funding Items

Policy/Funding Item 9

4.269 Recommendation - The Fish and Wildlife Service in coordination with the States and the Corps of Engineers should develop and implement a comprehensive plan for the management of the Upper Mississippi River Wildlife and Fish Refuge that considers all the fish and wildlife resources of the area and consists of the necessary strategic and operational components to make explicit the background, authorities, and justification for the refuge and objectives, policies, coordination measures, and procedures by which it will be operated.

4.270 Impacts of Recommendation - Implementation of this recommendation would provide a high degree of interagency coordination in fish and wildlife management, reduce conflicting practices, and prevent duplication of effort, thereby increasing the efficiency of fish and wildlife management on the river.

4.271 Impacts of No Action - No action would have no environmental impacts. However, an opportunity to improve upon existing management practices would be lost.

Policy/Funding Item 10

4.272 Recommendation - State and Federal natural resource agencies should cooperatively develop and implement their management programs so that the Upper Mississippi River is managed as an ecological unit.

4.273 Impacts of Recommendation - Implementation would bring about improved management of the river's natural resources.

4.274 Impacts of No Action - No impacts would result from no action. However, an opportunity to improve the management of the river's resources would be lost.

#### Policy/Funding Item 11

4.275 Recommendation - Congress should provide the Corps of Engineers with definitive authority and additional funding to assist the Fish and Wildlife Service and States in accomplishing fish and wildlife conservation and recreation projects on the Upper Mississippi River.

4.276 Impacts of Recommendation - The impact of this recommendation would be overall improvement in the capability of management agencies to protect and maintain the high quality fish and wildlife and recreational resources of the river. This improvement would be accomplished by clarifying authorities and by changing requirements in cost-sharing policies that currently make it very difficult to undertake projects to enhance the fish and wildlife and recreational resources of the river.

4.277 Impacts of No Action - No action would result in continued difficulty in undertaking specific positive actions to protect or enhance the resources of the river because of vague authorities and difficulties in finding local sponsors to satisfy cost-sharing requirements.

#### Policy/Funding Item 12

4.278 Recommendation - Future Mississippi River management budgets should show, as separate line items, programs that request funds to benefit recreation or fish and wildlife and that are not required to maintain the 9-foot navigation project.

4.279 Impact of Recommendation - This recommendation would have no direct impact, but would show where and for what purpose funds are actually being used.

4.280 Impact of No Action - No action would have no impacts.

#### Policy/Funding Item 13

4.281 Recommendation - Beneficiary/user data should be developed and used by appropriate agencies in managing water resources and developing cost allocation programs.

4.282 Impacts of Recommendation - This recommendation should have no direct environmental impact. Development of this data would allow for a more equitable assessment of costs to beneficiaries for projects on the Upper Mississippi River.

4.283 Impacts of No Action - No action would have no environmental impacts.



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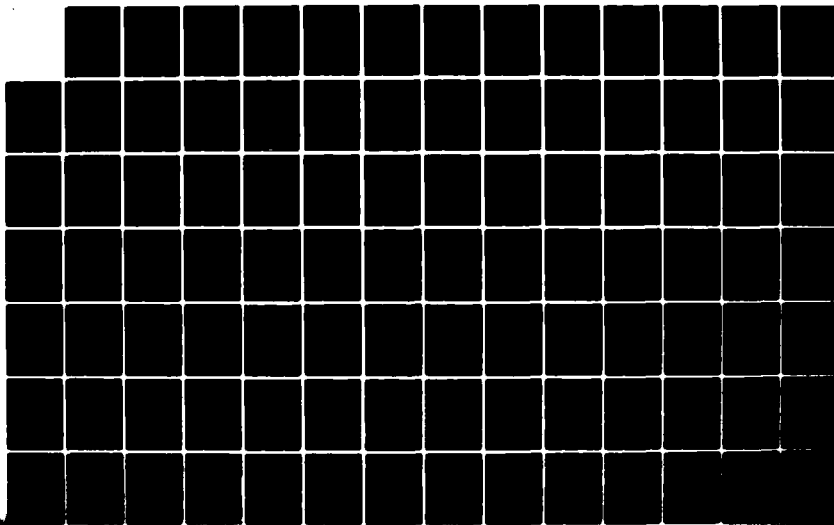
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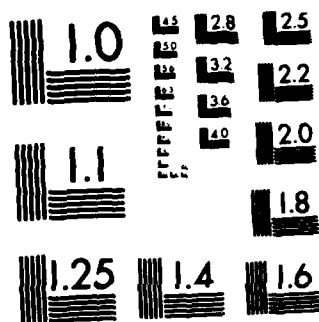
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#### Policy/Funding Item 14

4.284 Recommendation - Unified management objectives (recreation, fish and wildlife, commercial, etc.) should be developed for each pool or segment of pools. The development of unified management objectives must be consistent with legislative mandates for management of National Wildlife Refuges.

4.285 Impacts of Recommendation - No direct environmental impacts would result from this recommendation. However, the development of unified management objectives should improve and make more efficient the management of the river resources which in turn should benefit the resources.

4.286 Impacts of No Action - No direct environmental impacts would be associated with no action. However, an opportunity to improve management of the river resources would be lost.

#### Policy/Funding Item 15

4.287 Recommendation - Organisms not native to the Upper Mississippi River corridor should be cooperatively analyzed to determine compatibility with the integrity of the native communities before they are introduced.

4.288 Impacts of Recommendation - Exotic organism introductions in the past have had, for the most part, adverse impacts on the ecological balance of the native communities. Most introductions have been undertaken by small groups or individual State agencies. Implementation of this recommendation would help insure that if future introductions are considered they will receive a thorough scientific review by the appropriate States and Federal agencies.

4.289 Impacts of No Action - No action would maintain the status quo whereby each state is in essence its own regulator concerning the introduction of exotic species. This increases the potential for an exotic organism to be introduced without proper study and evaluation of impacts associated with that introduction.

#### Cumulative Impacts of Fish and Wildlife Policy/Funding Recommendations

4.290 The cumulative impact of these recommendations would be to improve the management of the fish and wildlife resources of the Upper Mississippi. This improvement would be accomplished through increased funding, developing broad-based management policies that address the river system as a whole, and increasing capabilities to accomplish a variety of management programs.

4.291 Many of the recommendations are designed to eliminate uncoordinated and sometimes conflicting management of the river's resources by managing agencies.

## Fish and Wildlife Further Study Items

### Further Study Item 19

4.292 Recommendation - The feasibility of protecting critical backwater areas from sedimentation should be studied.

4.293 Impacts of Recommendation - Conducting a study should have no environmental impacts. If feasible solutions for protecting critical backwater areas could be found, they would be of great value in maintaining the fish and wildlife values of these backwater areas at a high level.

4.294 Impacts of No Action - No direct impacts would be associated with no action. However, an opportunity to develop methods to protect critical backwater areas from sedimentation would be lost. Some estimates indicate that within 50 to 250 years, these areas will be filled in to a point that substantially reduces their value as fish and wildlife habitat.

### Further Study Item 20

4.295 Recommendation - A program to evaluate dredging and island creation in backwater areas for restoration purposes should be developed.

4.296 Impacts of Recommendation - The ultimate impact of this program would be the improvement of the fish and wildlife habitat values of selected backwaters. Individual projects could have adverse water quality and floodplain impacts, depending upon the nature and location of the project.

4.297 Impacts of No Action - No direct impacts would result from non-implementation. However, an opportunity to improve fish and wildlife habitat values in selected backwaters would not be taken advantage of.

#### Further Study Item 24

4.307 Recommendation - The impact of altering the cuts between the island separating Lake Onalaska from the main channel of the Mississippi River should be investigated. Structural measures should be built if the results of the investigation determine that the alterations would benefit Lake Onalaska.

4.308 Impacts of Recommendation - No impacts would be associated with conducting the investigation. If a feasible method of reducing sediment inflow into Lake Onalaska were found, it would be of great benefit in maintaining the high quality fish and waterfowl habitat that presently exists. Structural methods would undoubtedly have some adverse impacts associated with the construction, such as loss of habitat to the structures and localized increases in water turbidity. Also, reducing main channel flows into Lake Onalaska would increase flows in the main channel, potentially reducing dredging requirements in Lower Pool 7.

4.309 Impacts of No Action - No action would have no direct environmental impacts. However, a potential opportunity to develop a method to slow or abate the sedimentation problem in Lake Onalaska would be lost. Eventually, sedimentation will fill in the Lake and greatly reduce its fish and wildlife habitat value.

#### Further Study Item 25

4.310 Recommendation - Congress should provide funds to the Corps of Engineers to study the feasibility of rehabilitating the Spring Lake area of Pool 2.

4.311 Impacts of Recommendation - Conducting a feasibility study would have no environmental impacts. If proven feasible, rehabilitation could greatly enhance the fish and wildlife and recreational qualities of Spring Lake. It is also expected that shoaling problems at the head of Spring Lake could be solved.

4.312 Because the projected solution at this time is a long dike separating Spring Lake from the main channel of the river, it is likely that substantial water quality impacts would occur during the construction phase of such a project.

4.313 Impacts of No Action - No action would have no environmental impact. However, a potential opportunity to improve the resource qualities of Spring Lake would be lost.

Further Study Item 26

4.314 Recommendation - The monitoring program at Kruger Slough and Island 42 should be continued to document effects of opening side channels.

4.315 Impacts of Recommendation - There would be no impacts associated with implementation of this recommendation.

4.316 Impacts of No Action - There would be no impacts associated with non-implementation of this recommendation.

Further Study Item 27

4.317 Recommendation - The distribution of submerged aquatic vegetation, invertebrates (including clams), bottom types and depths, and submerged physical features of the river should be mapped.

4.318 Impacts of Recommendation - Mapping would have no discernible environmental impacts. The information gained would provide for better management decisions which in turn should benefit the fish and wildlife resources of the river.

4.319 Impacts of No Action - No action would have no environmental impacts.

Further Study Item 28

4.320 Recommendation - The means of controlling the pool water levels for the benefit of fish and wildlife and recreation in harmony with the 9-foot channel project should be investigated. If control is found to be feasible, the Corps of Engineers, Fish and Wildlife Service, and the States would pursue an agreement to implement this practice. In the interim, fish and wildlife should be considered in pool fluctuations presently being done for other purposes on the river.

4.321 Impacts of Recommendation - Conducting the investigation would have no environmental impacts. If controlling pool levels to benefit fish and wildlife and recreation in consideration of other interest on the river proves feasible, such control would be highly beneficial to the fish and wildlife resources of the river. Maintaining stable water levels at critical times during spawning, nesting, and lodge-building would be of significant benefits to many species of fish and Wildlife.

4.322 The impacts upon commercial navigation and riparian property owners would have to be carefully analyzed in the investigation.

4.323 Impacts of No Action - No action would entail the continuation of a problem on the river whereby inopportune water level fluctuations harm fish and wildlife resources.

Further Study Item 29

4.324 Recommendation - Primitive or natural areas should be identified and a follow-up designation made where appropriate.

4.325 Impacts of Recommendation - The impact of this recommendation would be to maintain certain areas on the river in an undeveloped state. In general, this preservation would have a positive impact upon the resources of the area. There may be adverse impacts upon certain groups of the recreational public if they are no longer allowed to engage in accustomed recreational activities in these areas because of new restrictions. Undoubtedly some controversy would be associated with individual designations, due to conflicting demands on the resource.

4.326 Impacts of No Action - The opportunity to protect areas of unique quality at an early stage would be lost. If protective measures are proposed only when an area is threatened by some specific action, there is increased likelihood of adverse impacts upon some sector of the public and also the resources itself.

Further Study Item 30

4.327 Recommendation - Forest management should be considered in the Upper Mississippi River System Master Plan.

4.328 Impacts of Recommendation - This recommendation would have no environmental impact. The UMRBC Master Plan studies are underway and forest management is not one of the topics being studied.

4.329 Impacts of No Action - No action would have no environmental impact.

Further Study Item 31

4.330 Recommendation - A study should be conducted to determine the most effective technique for management of bottomland hardwoods for wildlife.

4.331 Impacts of Recommendation - Conducting the study should have little environmental impact. Once developed, the techniques could greatly enhance the fish and wildlife habitat in the Mississippi River floodplain because a considerable amount of this type of habitat exists there.

4.332 Impacts of No Action - No action would have no environmental impacts. However, an opportunity to develop methods to improve fish and wildlife habitat would be lost.

#### Further Study Item 32

4.333 Recommendation - The life history of the fishes of the Upper Mississippi River should be studied.

4.334 Impacts of Recommendation - Life history studies themselves would have no environmental impact. The information gained would enable better management decisions which in turn should benefit the fishing resource of the river.

4.335 Impacts of No Action - No action would have no environmental impacts.

#### Further Study Item 33

4.336 Recommendation - The Corps of Engineers, Wisconsin Department of Natural Resources, U.S. Fish and Wildlife Service, and Vernon County should develop an agreement for placing culverts and opening side channels to Blackhawk County Park near Victory in Pool 9.

4.337 Impacts of Recommendation - This proposal would return freshwater flows to some side channels cut off by construction of roads to the park, thereby improving the fish and wildlife habitat values of these sloughs.

4.338 Impact of No Action - The habitat quality of the sloughs would continue to deteriorate due to stagnation.

#### Cumulative Impact of Fish and Wildlife Further Study Recommendations

4.339 These recommendations center on two areas: project-specific studies and study-area-wide studies. The five rehabilitation studies (Weaver Bottoms, Big Slough, Lake Onalaska, Spring Lake, and Blackhawk Park) could lead to the protection and rehabilitation of as much as 15,000 acres of valuable river lake and backwater habitat. The remainder of the recommendations have the potential to increase greatly knowledge of the river and its fish and wildlife resources and to develop techniques for protecting and enhancing these resources. Cumulatively, implementation of these recommendations should result in significant benefits to the resource through wiser management.



## AESTHETIC RECOMMENDATIONS

### Aesthetic Policy/Funding Item

#### Policy/Funding Item 16

4.340 Recommendation - Scenic easements/acquisitions should receive a higher priority in conjunction with the implementation of the Great River Road and other applicable State and Federal programs.

4.341 Impacts of Recommendation - Greater emphasis on scenic easements should result in more scenic easements obtained in conjunction with Great River Road projects and enhanced visual aesthetics for the traveling public and recreationists. Because scenic easements maintain areas in a natural state, fish and wildlife would benefit from the preservation of these areas in their natural condition.

4.342 Impacts of No Action - No action would have no environmental impacts.

### Aesthetic Further Study Item

#### Further Study Item 34

4.343 Recommendation - Aesthetics of the area should be protected as part of any management plan for the Mississippi River.

4.344 Impacts of Recommendation - Increased emphasis on the protection of aesthetic quality would benefit all river users.

4.345 Impacts of No Action - No action would have no direct environmental impact. An opportunity to increase aesthetic protection would be lost which in the long term could mean a reduction in aesthetic qualities along the river.

### Cumulative Impact of Aesthetic Recommendations

3.346 These recommendations would help insure that aesthetics are given full consideration in management plans and decisions on the river. Such consideration should lead to increased protection and maintenance of the visual qualities of the Upper Mississippi River.

## COMMERCIAL NAVIGATION RECOMMENDATIONS

### Commercial Navigation Policy/Funding Items

#### Policy/Funding Item 17

4.347 Recommendation - So that operating regulations for fixed and opening bridges can be vigorously enforced by the U.S. Coast Guard, the Act of August 18, 1864, Act of March 3, 1899, Bridge Act of 1906, and the General Bridge Act of 1946 should be amended to provide for civil penalties in certain circumstances and for other purposes as recommended by the U.S. Coast Guard.

4.348 Impacts of Recommendation - This recommendation would allow the U.S. Coast Guard to effectively enforce operating regulations, particularly in the case of less serious violations. With amendments to provide for administrative penalties that can be vigorously enforced, the Coast Guard can better insure safe and reasonable navigation needs for both commercial and recreational users.

4.349 Impacts of No Action - With no action, problems with enforcement (especially for minor violations) will continue, and possibly jeopardize the operational and safety procedures of navigation.

#### Policy/Funding Item 18

4.350 Recommendation - Obstructive bridges should be rebuilt to provide adequate horizontal and vertical clearances. The Truman-Hobbs Act should continue to be used in rebuilding bridges on the basis of navigational needs and be amended to include:

a. Replacement or repair of bridge pier protection systems.

b. Benefits to land as well as marine interests. Since public money is being spent, the total public benefit should be considered in benefit-cost ratios.

4.351 Impacts of Recommendation - This recommendation would provide for replacement of bridges that may be determined potentially unsafe and obstructive to both bridge and navigational traffic. The amendment would include cost-sharing for bridge pier protection systems to insure both bridge and vessel safety.

4.352 Impact of No Action - With no action, inadequate and/or obstructive bridges will continue to be hazards to navigation and bridge traffic. Monies for cost-sharing for bridge pier protection would not be available.

## Commercial Navigation Further Study Items

### Further Study Item 35

4.353 Recommendation - Congress should direct the Department of Transportation or the Corps of Engineers to review Federal, State, and local regulations pertaining to commercial navigation, terminals, and support facilities with a view toward defining more clearly the areas of jurisdiction and proposing the elimination of conflict areas as appropriate.

4.354 Impact of Recommendation - Conducting the review may have an end result of reducing costs and delays to commercial transportation facilities in receiving local, State and Federal permits for their projects. Conducting the review would have no impact.

4.355 Impacts of No Action - No action would have no direct impact. The opportunity to reduce unnecessary delays and costs associated with regulatory requirements would be lost.

### Further Study Item 36

4.356 Recommendation - A study to identify acceptable fleeting areas to meet present regional shortages and future regional needs should be conducted.

4.357 Impacts of Recommendation - Conducting the study would have no impact. The results of the study would have beneficial uses in that it would identify those areas that could be used for fleeting with acceptable environmental and economic impacts.

4.358 Impacts of No Action - No action would result in the continuation of the current situation in which fleeting areas are proposed on an as-needed basis. This procedure has proved inefficient in providing fleeting areas with acceptable environmental and economic impacts in a timely manner.

### Further Study Item 37

4.359 Recommendation - The Coast Guard should study the feasibility of establishing a marked channel for commercial transportation vessels in Lake Pepin.

4.360 Impact of Recommendation - Conducting the study would have no impact. If feasible, such a channel would improve boating safety at high-use times on Lake Pepin.

4.361 Impact of No Action - No impact would result from no action. In the future, the problem may become more severe, requiring action of some type.

#### Further Study Item 38

4.362 Recommendation - The Corps of Engineers should conduct feasibility studies and make recommendations to Congress which address projected capacity limitations at Locks and Dams 2 and 3 caused by demand increases for commercial and recreational craft.

4.363 Impact of Recommendation - Feasibility studies could help predict potential traffic congestion during peak use periods by documenting demand increases in river crafts. By identifying growth projections and capacity limitations, commercial and recreational river transportation safety problems could be minimized.

4.364 Impact of No Action - Potential traffic congestion could become a problem during periods of peak use by both commercial and recreational craft.

#### Further Study Item 39

4.365 Recommendation - The U.S. Coast Guard should reassess its capability to operate and maintain the navigational aid system within its currently available resources and seek additional capability if necessary.

4.366 Impact of Recommendations - The impact of this recommendation would be improved safety on the river for commercial traffic.

4.367 Impact of No Action - No action would result in the continued deficiency in navigational aids due to lack of funds.

#### Cumulative Impact of Commercial Transportation Recommendations

4.368 These recommendations should reduce unnecessary constraints on commercial navigation, reduce safety hazards, and facilitate satisfaction of future needs before they become critical problems. All of these recommendations can be accomplished with minimal environmental impact and may even lessen adverse impacts through advance multi-agency planning.

## RECREATION RECOMMENDATIONS

### Recreation Action Items

#### Action Item 19

4.369 Recommendation - Primitive recreational use sites should be maintained on an interim basis until implementation of comprehensive management plans.

4.370 Impacts of Recommendation - Maintaining primitive recreational areas would provide significant benefits to recreational users of the Mississippi River. Studies have shown that open sandy areas with some tree crown cover and sloping beaches are used extensively for camping, picnicking, and swimming. GREAT I has identified 30 sites where maintenance of primitive recreational areas should be considered in Pools 2 through 10.

4.371 Maintenance of primitive recreational areas generally requires the maintenance of open sandy areas with some topography, scattered large trees for shade, and gently sloping beaches for boat beaching and swimming. Achieving such an area would have adverse impacts upon fish and wildlife habitat and water quality.

4.372 Maintaining an open sandy area greatly reduces the site's biological productivity and habitat value and keeps it in that condition of low productivity. Also, erosion of material from these sites can impact on adjacent aquatic habitats. Maintaining the 30 sites identified by GREAT I for consideration would result in the disturbance of about 400 acres of revegetation disposal sites and 1100 acres of undisturbed habitats, primarily bottomland hardwoods.

4.373 Shaping and sloping of beaches with heavy equipment has some water quality impacts such as increasing turbidity and suspended solids and the washing of oil and grease off the machinery into the water. Generally, however, water quality impacts are minor.

4.374 The benefits and adverse impacts associated with the maintenance of these sites will have to be carefully evaluated when the individual sites for this action are considered.

4.375 Impacts of No Action - No action would result in the deterioration of existing sites along the river as suitable areas for primitive recreation. These areas revegetate and are then no longer used for that particular type of recreational experience. With revegetation, the habitat value of these areas to wildlife would increase.

4.376 Dredged material disposal practices have changed over the last 5 years. The type of operation that primarily created these areas in the past, i.e., hydraulic placement with little or no containment, is no longer used. It is unlikely that this type of operation will be conducted in the future, because of other resource impacts. Thus, in the long term, there would be a continuing reduction in the number of sites suitable for primitive recreational use at a time when demand for this type of recreational experience is expected to increase.

#### Action Item 20

4.377 Recommendation - "Lockage waiting areas" should be developed where suitable to reduce hazards associated with recreational lockages.

4.378 Impacts of Recommendation - The development of lockage waiting areas for recreational craft would reduce the safety hazard associated with large numbers of recreational craft congregating at the locks and dams, waiting for lockage. Development of the areas would have impacts on local resources, with magnitudes varying with the nature of the waiting area. Placing moving buoys would have little impact, while the creation of an island could have significant impacts on water quality and fish and wildlife habitat. The impacts would have to be carefully evaluated on a case-by-case basis.

4.379 Impacts of No Action - No action would allow the continuance of an existing safety problem at some of the locks and dams on the river. With the projected increases in river-based recreation, the problem may become more acute at some of the more heavily used locks.

#### Action Item 21

4.380 Recommendation - Detailed uniform recreational facility guides in a format which includes information unique to the Mississippi River (boating hazards, special regulations, refuge management, locking procedures, etc.,) should be provided.

4.381 Impact of Recommendation - Implementation would benefit recreationists by providing more information on recreational opportunities and other factors on the river that could impact on their use of the river.

4.382 Impact of No Action - No impacts would result from the no action alternative.

#### Action Item 22

4.383 Recommendation - Uniform and/or upgraded signing of recreation areas should be provided.

4.384 Impact of Recommendation - Implementation would benefit recreationists by providing more information on recreational opportunities.

4.385 Impact of No Action - There would be no impact with no action.

Action Item 23

4.386 Recommendation - Control structures should be marked or modified where appropriate to reduce hazards to recreational navigation.

4.387 Impacts of Recommendation - Implementation of this recommendation would improve public safety on the river.

4.388 Impacts of No Action - Non-implementation would allow the continued existence of unmarked navigation hazards on the river.

Action Item 24

4.389 Recommendation - States should adopt and enforce uniform noise levels for recreation boats and other vehicles.

4.390 Impact of Recommendation - Reduction of noise from recreational craft would improve the recreational experience for river users and reduce disturbances to wildlife to some degree.

4.391 Impacts of No Action - No action would have no environmental impact.

Action Item 25

4.392 Recommendation - A bikeway should be provided in conjunction with Great River Road developments.

4.393 Impacts of Recommendation - Development of a bikeway would have beneficial impacts by increasing recreational opportunities in the river corridor. A bikeway would have adverse wildlife impacts primarily from loss of habitat and increased human activity in the river corridor.

4.394 Impacts of No Action - No action would have no environmental impacts. An opportunity to increase recreational opportunities along the river corridor would be lost.

Action Item 26

4.395 Recommendation - A system of canoe trails should be developed through selected backwater areas as a feature of appropriate recreation planning efforts.

4.396 Impacts of Recommendation - Development of canoe trails would have beneficial impacts by increasing recreational opportunities in the river corridor. The potential exists for adverse impacts upon wildlife from increased human activity in relatively undisturbed areas.

4.397 Impacts of No Action - No action would have no environmental impacts. An opportunity to increase recreational opportunities in the river corridor would be lost.

Action Item 27

4.398 Recommendation - The Fort Snelling back channel under the Mendota Bridge should be opened to the picnic and swimming areas.

4.399 Impacts of Recommendation - Opening the channel would increase recreational opportunities in the metropolitan area for river users. There would be some temporary minor water quality impacts from the dredging activity. Disposal of the material could impact a wildlife habitat, depending on location. Increased use of the channel would create disturbances, reducing its value on fish habitat.

4.400 Impact of No Action - No action would have no environmental impact.

Action Item 28

4.401 Recommendation - State and Federal agencies concerned with boating safety should intensify efforts to educate recreational boaters on rules of the road and lighting requirements applicable to commercial and recreational vessels.

4.402 Impact of Recommendation - The impact of this recommendation would be improved public safety on the river.

4.403 Impact of No Action - No action would have no environmental impact.

Action Item 29

4.404 Recommendation - The U.S. Coast Guard Auxiliary, boating clubs, and others concerned with boater education, should intensify their education efforts on safety, navigation, and hazards peculiar to vessel operation on the Upper Mississippi River.

4.405 Impact of Recommendation - An expanded program for boater education would be made available to a greater number of people.

4.406 Impact of No Action - No action would have no direct impact. However, an opportunity to improve recreational boater knowledge of safety on the river would be lost.

Action Item 30

4.407 Recommendation - Rental agencies should be required to better brief their patrons on how to handle their boats, river hazards, rules of the road, courtesy, and lockage procedures.

4.408 Impact of Recommendation - This recommendation would serve to make the public more aware of safe boating procedures and potential hazards with an end result of fewer boating accidents on the river. The recommendation would impose more regulation burdens upon rental agencies/small businesses.

4.409 Impact of No Action - No impact other than potential continuance of unnecessary boating accidents and injuries.



#### Policy/Funding Item 20

4.419 Recommendation - The Corps of Engineers should monitor lockages to ensure the proper application of existing lockage regulations and to identify specific problem areas.

4.420 If problems are identified, consideration should be given to providing signage, low-power radio transmissions (AM, CB, and/or Marine) near the locks to dispense information, and/or lockage waiting areas. Information on designated times should be widely publicized.

4.421 Impacts of Implementation - This recommendation should have beneficial impacts by insuring equitable treatment of various publics in lockage priorities.

4.422 Impacts of No Action - No action would continue the problem of inequitable treatment of the various publics at certain locks. Surveys indicate that at certain locks, commercial traffic receives preferential treatment over recreational traffic.

#### Policy/Funding Item 21

4.423 Recommendation - High impact recreational development such as large power boat accesses or marinas should be discouraged in or adjacent to areas identified as exceptionally good for hunting, trapping, and fishing or "closed refuge areas."

4.424 Impact of Recommendation - The result would be reduced impacts upon fish and wildlife and their habitat of the ever increasing recreational usage of the Upper Mississippi River.

4.425 Impact of No Action - Heavy recreational development in close proximity to certain areas could result in an increase in conflicting uses and potential safety hazards. Valuable fish and wildlife habitat could be jeopardized.

#### Policy/Funding Item 22

4.426 Recommendation - River management agencies should increase their efforts to work together cooperatively in undertaking site specific intensive recreation surveys and continuous annual sample data collection for input into a recreation resource monitoring program. Methods developed by the GREAT I and GREAT II Recreation Work Groups should be used in these efforts.

4.427 Impact of Recommendation - The recreation surveys and data collection would have no impact. The data obtained would provide management agencies with a continuous base of data on which to assess their management decisions for the recreational resource which in turn should improve the quality of recreational experiences on the river.

4.428 Impact of No Action - No action would have no direct impact. However, the opportunity to improve management of the river's recreational qualities would be lost.

Policy/Funding Item 23

4.429 Recommendation - A diversity of recreational opportunities should be provided within the river corridor in developing any management plans.

4.430 Impact of Recommendation - This recommendation considers the need for a diverse range of opportunities and areas that could be provided within the river corridor. Management plans should consider the types and degrees of recreational opportunities available at each recreational area. User conflicts can be reduced by providing for a diversity of experiences and distributing various types of recreation uses within management planning.

4.431 Impact of No Action - The potential for increased conflicts between recreational users will continue if management plans do not address the problem of distribution of various activities at recreational areas.

Policy/Funding Item 24

4.432 Recommendation - Publicly-owned recreational boat-launching accesses should be maintained or relocated.

4.433 Impact of Recommendation - Implementation should have beneficial recreational impacts by providing adequate public access to the river.

4.434 Depending upon the location of access areas, individual areas could have adverse impacts upon water quality and fish and wildlife of these areas, both from construction activities and increased human uses. These impacts must be evaluated on a case-by-case basis when individual projects are considered for implementation.

4.435 Impact of No Action - No action would result in some public accesses becoming unusable due to lack of maintenance. It is unlikely that this would ever become a significant problem as public pressures for access are likely to insure that some level of access to the river is maintained.

#### Further Study Item 40

4.436 Recommendation - The Corps of Engineers, in coordination with the Fish and Wildlife Service and the States, should develop and implement a recreation master plan for the Upper Mississippi River system.

4.437 Impact of Recommendation - Implementation of this master plan would provide for coordinated enhancement of recreational opportunities on the river based upon consideration of the resources of the river. An updated master plan would insure that recreational opportunities are provided where the demand for them exists while minimizing the adverse impacts on other river resources such as fish and wildlife habitat, water quality, and aesthetics. The development of a coordinated plan would insure that uncontrolled development that can have substantial adverse effects is kept to the minimum possible.

4.438 Impacts of No Action - For this particular recommendation, there is not a no action alternative. The Corps of Engineers is required to develop a recreation master plan for the Upper Mississippi River and is currently in the process of doing so in coordination with the States and Federal agencies.

#### Further Study Item 41

4.439 Recommendation - A determination should be based on unified resource management objectives (Phase I of Recreation Master Planning Development) of the feasibility and acceptability of the recreation sites listed in Exhibit 6 (of the Main Report) to determine which should be funded for implementation to meet existing recreational demand and need. When determined appropriate, specific recreational developments should be immediately implemented.

4.440 Impact of Recommendation - Implementation of this further study item would go far towards insuring that documented recreational needs are satisfied and that the compatibility of recreational developments with other resource values and needs on the river is considered.

4.441 Individual projects may have adverse impacts upon fish and wildlife, water quality, and other resource values that must be evaluated when those projects are considered.

4.442 Impacts of No Action - No action would result in recreational needs being satisfied in an incomplete and haphazard manner by government agencies and the private sector. This type of development generally has increased adverse impacts on other resource values because of the lack of a comprehensive overall evaluation of resource needs and impacts of development.

#### Further Study Item 42

4.443 Recommendation - Water surface use in pools or portions of pools where conflicts exist should be identified and zoned. No wake zones or restricted use areas should be established in constricted areas and/or where heavy recreations use occurs.

4.444 Impact of Recommendation - Management planning would consider identifying and zoning areas of conflicts of multiple uses and areas of safety hazards. Regulations could identify problem areas and allow for enforcement in hazardous or restricted areas posted along the river system.

4.445 Impact of No Action - Areas of conflicting and heavy recreational uses will continue to present potential safety hazards to commercial and recreational navigation.

#### Further Study Item 43

4.446 Recommendation - Further studies which focus on the economic and social benefits and environmental impacts of private leases on Federal land should be conducted. Such leases should be phased out when a needed public use can be demonstrated.

4.447 Impacts of Recommendation - A program such as this should benefit the resources of the river and the ability of the public to use and enjoy these resources. The program is likely to be highly controversial because private use of public lands is a long-standing tradition on the river.

4.448 Impacts of No Action - No action would allow the continuation of the lease system which allows private use of public lands to the exclusion of the public.

#### Cumulative Impact of Recreation Recommendations

4.449 These recreation recommendations should enhance the recreational opportunities on the river and make it possible to enjoy these opportunities in a safe and environmentally compatible manner. Conflicts between recreational and other user groups on the river exist and will continue. Implementation of these recommendations should greatly assist in reducing and minimizing these conflicts compared to what conflict would be expected to arise without any management efforts in this direction.

4.450 It is not yet possible to evaluate accurately the cumulative impacts of the many site-specific projects recommended for consideration in Action Item 19 and Further Study Item 41 because of a general lack of site-specific information that must be acquired when the projects are considered for implementation. Generally, if these projects were all developed, considerable impact could be expected upon fish and wildlife resources from loss of habitat and increased human activity on the river. Also, conflicts with commercial transportation interests would be increased if these projects stimulated increased boater use on the river.

## FLOODPLAIN MANAGEMENT RECOMMENDATIONS

### Floodplain Management Action Items

#### Action Item 33

4.451 Recommendation - Detailed topographic and hydrographic maps of the Upper Mississippi River bottomlands in the GREAT I area (at a scale no smaller than 1:12,000; or 1 inch equals 1,000 feet; on an orthophoto base with a contour interval of 2 feet) should be produced.

4.452 Impacts of Recommendation - No direct impacts would be associated with implementation. The maps produced would improve management decisions on the river, which in turn should have beneficial effects upon the resources of the river.

4.453 Impacts of No Action - No impacts would result if the maps were not developed.

#### Action Item 34

4.454 Recommendation - Water resource project on tributaries of the Upper Mississippi River in the GREAT I area should address:

a. Project-induced potential changes in tributary discharges during floods.

b. Project-induced potential changes in the bed-load sediment transport capability of the tributary stream.

4.455 Impacts of Recommendation - Implementation may reduce to some extent the impacts of such projects on dredging requirements on the Mississippi River. This in turn would reduce the impacts of dredging and disposal operations.

4.456 Impacts of No Action - It is difficult to evaluate the impacts of no action. Agencies developing water resource projects should already be considering these potential changes in their planning processes. No action would mean that agencies that are not aware of this problem would continue to fail to address it in the future, resulting in water resource projects with the potential of increasing dredging problems on the Mississippi River.

## Floodplain Management Policy/Funding Items

### Policy/Funding Item 25

4.457 Recommendation - Uniform standards for floodplain management should be developed for States and municipalities along the GREAT I portion of the Mississippi River. Changes in enabling legislation may be necessary.

4.458 Impact of Recommendation - The recommendation would provide for equitable and uniform standards to be developed for floodplain management by the States and municipalities. Consistent standards for floodplain encroachment and their uniform administration would greatly reduce inconsistencies among the States and municipalities.

Impact of No Action - Inconsistencies in standards and allowable floodplain encroachment limits will continue to present problems for floodplain management

### Further Study Item 44

4.460 Recommendation - Funds should be provided to the Upper Mississippi River Basin Commission to study the feasibility of mathematical models for floodplain management, including the Compound Stream Flow Model, and to develop a model(s) based on the findings and recommendations of the study.

4.461 Impacts of Recommendation - No environmental impacts would be associated with conducting these studies. Eventual development of a workable model would provide the means to make better management decisions on the river pertaining to the floodplain impacts of activities in the floodplain.

4.462 Impacts of No Action - No environmental impacts would be associated with no action. However, there would be a lost opportunity to develop a tool with which to make wiser floodplain management decisions on the river.

### Cumulative Impact of Floodplain Management Recommendations

4.463 The cumulative impact of these recommendations should be an improvement in the ability of managing agencies to manage the floodplain and to evaluate impacts upon it. This improved ability should result in better management decisions relative to the floodplain.

## CULTURAL RESOURCES RECOMMENDATIONS

### Cultural Resources Further Study Item

#### Further Study Item 45

4.464 Recommendation - A comprehensive cultural resources inventory of known sites in the GREAT I area should be done as input to future management decisions.

4.465 Impact of Recommendation - This recommendation would be beneficial to the preservation of cultural resources along the Upper Mississippi River by allowing input from cultural resources data not only into the Federal planning process but also into planning at the State and local levels.

4.466 Impact of No Action - The protection and consideration of cultural resources during the planning process for any federally licensed or funded activity is required by a number of Federal laws and Federal agency regulations. Among these regulations are Executive Order 11593; the Advisory Council's Procedures for the Protection of Historic and Cultural Properties (36 CFR Part 800); the National Historic Preservation Act of 1977; Preservation of Historic and Archaeological Data of 1974 (P.L. 93-291); and Identification and Administration of Cultural Resources (33 CFR Part 305). However, these regulations include few provisions for inventorying cultural resources at the State and local levels. No action on this recommendation would mean considerably less information on cultural resources for State and local planners to utilize and would probably result in the loss of some cultural resources in the future.

## PUBLIC PARTICIPATION RECOMMENDATION

### Public Participation Action Item

#### Action Item 35

4.467 Recommendation - The Upper Mississippi River Basin Commission should encourage and coordinate efforts to develop information and education programs for the Upper Mississippi River. Such programs should focus on the multiple uses and values of the resource.

4.468 Impacts of Recommendation - Implementation would have no direct environmental impacts. Improved public awareness of the river and its resources should promote wiser uses of these resources.

4.469 Impact of No Action - No environmental impacts would be associated with no action.

## ONGOING PLANNING/COORDINATION RECOMMENDATIONS

### Ongoing Planning/Coordination Action Items

#### Action Item 36

4.470 Recommendation - The agencies represented in GREAT I should, by letter of agreement, continue to coordinate implementation of the Channel Maintenance Plan and all other implementable recommendations through the continuation of the ongoing inter-agency management coordination team. The Fish and Wildlife Service and the Corps of Engineers would be the initial co-chairs. Chairmanship should then be rotated among participating agencies. Participation in this activity will be staffed and funded by individual agency contributions. Agencies will request additional appropriations within existing programs where necessary to accomplish this effort.

4.471 Impact of Recommendation - This recommendation would have no direct environmental impact. Continuation of an established coordination effort would insure better protection of the resources of the river.

4.472 Impact of No Action - The no action alternative would have no impact. It is likely that, if no formal coordination procedures were recommended by GREAT I, coordination would continue anyway under current procedures and something similar to the procedures recommended by GREAT would evolve.

#### Action Item 37

4.473 Recommendation - The following mechanisms should be used in the ongoing coordination and implementation of GREAT I recommendations.

1. The inter-agency On-Site Inspection Team recommended by GREAT should be continued to provide consultation in the site-specific implementation of the Channel Maintenance Plan and to aid in resolution of new problems which may develop during the annual dredging seasons.

2. A channel dimensions review committee should be established, consisting of representatives from the U.S. Army Corps of Engineers, U.S. Coast Guard, the navigation industry, plus any other concerned State or Federal agency.

3. The existing independent Upper Mississippi Conservation Committee is encouraged to participate in the ongoing interagency management coordination team. It is suggested that they evaluate their role in this effort and participate in a manner that they feel appropriate.

4.474 Impacts of Recommendation - This recommendation would have no direct environmental impact. Mechanisms for ongoing coordination of management efforts should provide better management, which in the long term would benefit the resources of the river.

4.475 Impacts of No Action - The no action alternative would have no direct impact. However, by not providing for mechanisms of coordination, this alternative would increase the likelihood of poorly coordinated management efforts. This, in turn, would increase the chance for adverse impacts resulting from these decisions.



#### Action Item 38

4.476 Recommendation - Monitoring of GREAT I implementation from an independent citizen perspective should be continued by the Minnesota-Wisconsin Boundary Area Commission (MWBAC). The States of Minnesota and Wisconsin should fund this effort as a work item of the MWBAC.

4.477 Impact of Recommendation - There would be no direct environmental impact associated with this recommendation. It would provide a means for continued citizen input to management decisions above and beyond normal procedures.

4.478 Impact of No Action - The no action alternative would have no direct environmental impacts. Citizen participation would continue under current public notice, meeting, and hearing procedures.

#### Action Item 39

4.479 Recommendation - The Upper Mississippi River Basin Commission, through its Great River Study Committee, should develop a total river resource management plan. As resources for this plan, the UMRBC should use the products of GREAT I, II and III and the UMRBC master plan reports as well as other relevant data.

4.480 Impact of Recommendation - In the long run, the development of an overall plan for resource management should have a beneficial impact upon the ability of the Upper Mississippi River and its resources to provide the various demands put upon it. Such a plan obviously would involve tradeoffs between the various interests, and these tradeoffs would result in adverse and beneficial impacts upon the resource. At the time the plan is developed and followup actions are proposed, these impacts would have to be evaluated.

4.481 Impact of No Action - The no action alternative would have no direct impacts. If no totally comprehensive plan were developed, various other plans, such as the GREAT I, II, and III plans and the UMRBC master plan, would be followed to varying degrees with impacts that cannot be evaluated here.

Ongoing Planning/Coordination Policy/Funding Items

Policy/Funding Item 26

4.482 Recommendation - As part of the on-going monitoring of GREAT recommendations, the following guidelines of the UMRBC are endorsed:

1. The final team report of each GREAT shall be submitted to the Commission through the Great River Study Committee for a 45-day field and public review. The Commission staff will distribute it appropriately.
2. The Chairman of the Commission shall convene at least one public hearing at the conclusion of the review of each GREAT report. The public will be provided a 30-day period following the hearings to submit additional statements to the Chairman.
3. The results of the review - all comments, suggestions for revision, and the transcript of hearings - shall be referred to the Great River Study Committee for consideration and resolution. The Great River Study Committee will prepare a transmittal report, including results of the review, for Commission approval and subsequent submission to the Water Resources Council.
4. Until and unless the Commission determines to include the GREAT Products as components of the CCJP, the Commission will not require the preparation and filing of an Environmental Impact Statement (EIS). However, EIS's may be required for specific major actions. Such EIS's will be prepared and filed by the appropriate implementing agencies.
5. The GREAT reports shall be submitted forward through appropriate channels to Washington and to the State governments by the Commission, the U.S. Army Corps of Engineers, the participating Federal Agencies, and the States.
6. The Commission, through its Great River Study Committee, shall monitor progress of the States and Federal Agencies in implementing the recommendations of the final GREAT reports and report on this process to the public and the Congress.

4.483 Impact of Recommendation - This recommendation would have no direct environmental impact. Providing a procedure for review of the GREAT I products should insure that the public and agency review is expedited and that those recommended actions which would most benefit the resources of the river are implemented as soon as possible.

4.484 Impact of No Action - The no action alternative would have no direct impacts. However, without a clearly described review procedure, delays in the review procedure would occur which ultimately would result in delays in implementation of actions to maintain and enhance the resources of the river.

#### Ongoing Planning/Coordination Policy/Funding Items

##### Further Study Item 46

4.485 Recommendation - The Upper Mississippi River Basin Commission should examine the feasibility of using the Geographic Information System (GIS) as a land and water use management tool.

4.486 Impacts of Recommendation - This recommendation would have no direct environmental impact. If feasible, the GIS would be a tool for better and more efficient management decisions.

4.487 Impacts of No Action - No environmental impacts would result from the no action alternative.

##### Further Study Item 47

4.488 Recommendation - Land ownership and management entities within the river should be documented and assessed.

4.489 Impacts of Recommendation - This recommendation would have no environmental impacts. The information gathered would make management of public lands easier.

4.490 Impacts of No Action - No impacts would result from the no action alternative.

#### Cumulative Impact of On-Going Planning/Coordination Recommendations

4.491 These recommendations should insure future interagency coordination and planning for the implementation of GREAT recommendations and many other management activities on the river. This should result in better management decisions because of the broader base of input into these decisions.

4.492 These recommended coordination procedures will slow down the decision-making processes in many cases and make them more expensive. Also, Federal agencies and the States may find these management authorities somewhat eroded by the coordination requirements. These are the type of tradeoffs necessary to insure that all interests on the river are represented in the decision-making process to achieve well-balanced management of the resources of the Upper Mississippi River.

## 5.000 PUBLIC INVOLVEMENT

5.001 One of the stated objectives of GREAT was to develop procedures to assure an appropriate level of public participation. Since the GREAT study began in October 1974, citizen input has been obtained in various ways. A Public Participation and Information (PPI) Program has attempted to provide information to the public, obtain public response, and incorporate public viewpoints into all major planning decisions. A PPI Work Group (PPIWG) was formed to carry out these duties throughout the study.

5.002 From October 1974 until August 1976, the PPIWG was staffed and chaired by the Upper Mississippi River Basin Commission (UMRBC). The PPIWG was composed of about 300 citizens and was open to anyone interested in participating. "Bridges" (people from throughout the geographic study area who volunteered to act as local staff extensions) assisted in press releases, helped to organize meetings, and identified "local river experts." Task group meetings prepared various public activities. Staff obligations were contracted out to a private consulting firm, Dan McGuinness and Associates, Wabasha, Minnesota, in July 1976. One of the responsibilities of the firm was to broaden the citizen participation efforts.

5.003 In October 1976, the PPIWG endorsed a volunteer Executive Board of 8-10 people who met almost monthly to guide the PPI program. The entire PPIWG kept informed of GREAT I activities through full membership meetings and staff activities, and were invited to all Executive Board meetings. The Executive Board has a representative with an equal vote at the Plan Formulation Work Group meetings. Since May 1974, public input has been obtained in several ways: town meetings, special workshops, questionnaires, special projects, periodic PPIWG full meetings, and various staff work.

5.004 In January 1975, GREAT held a series of 8 "town meetings" to introduce GREAT to the public and ask them to help GREAT identify problems on the river for study. In October and November 1975, another series of 6 town meetings was held to review the problems selected for study and to give the public a second, early, formal opportunity to comment on the problem identification process. The UMRBC recorded public input for GREAT in two town meetings reports for the problem identification phase of GREAT. Since October 1976, the PPI has operated at three levels: the general public, PPIWG, and the Executive.

5.005 The Executive Board's position papers recorded modified public recommendations as the study progressed. The intensive activity by this Board has produced a well informed citizen body, capable of providing very valuable input.

5.006 The PPIWG has published an appendix to the GREAT I report documenting public involvement.

5.007 Because the GREAT study has been progress for 5 years, it has focused attention on important issues concerning the river. In response to Council on Environmental Quality regulations (40 CFR Part 1501.7), a scoping process

was initiated on 14 May 1979 to involve the public and other agencies and interested groups in determining the issues to be addressed in this draft EIS. A letter containing a draft scope for the EIS was mailed to the 2,500 agencies, interest groups, and private citizens on the GREAT I mailing list. Of the 2,500, only 7 responses were received, substantiating the completeness of the GREAT I study in involving the public and identifying the major issues. The scope of the EIS was modified in response to these letters and from input provided by GREAT I team members.

5.008 The draft EIS was sent to the agencies listed in Exhibit 1. Ten letters containing comments on the draft EIS were received; these are included in the comment and response section of this document. In some instances, the DEIS comments were part of a longer letter of comment on the GREAT I draft report and appendixes. In those instances, only the DEIS comments are printed here to reduce volume. A complete set of comments on the GREAT I draft report is on file at the St. Paul District Office of the Corps of Engineers.

## 6.000 SUPPLEMENTARY ENVIRONMENTAL DOCUMENTS

6.001 Because this EIS employs the tiering concept, the purpose of this section is to explain what additional environmental documents probably will be necessary to implement the various GREAT I recommendations.

### DREDGED MATERIAL PLACEMENT PLAN (DMPP) (ACTION ITEMS 1 AND 2)

6.002 GREAT I recognizes that the DMPP must be flexible to deal with the changes that will occur before and during the period when the plan is to be implemented (1985-2025). Many factors will impact upon implementation of the DMPP. Some of the more important are:

1. Level of funding for the Corps operation and maintenance functions.
2. Changes in Federal and State laws, regulations, and policies.
3. Changes in the natural resources at the sites and along the river as a whole.
4. Whether channel maintenance recommendations important to the implementation of the DMPP are acted on.
5. Errors in projections pertaining to dredging volumes, frequencies, and beneficial use demands.
6. Technological advances in channel maintenance.
7. Increased knowledge of the river and its resources.

6.003 When a DMPP site is proposed for actual use, the Corps will be required to prepare an assessment to address the impacts specific to that particular dredging job. Also, in some cases, a Section 404(b) evaluation, as required by Section 404(b) of the Clean Water Act of 1977, will be necessary.

### CHANNEL MAINTENANCE AND RIVER RESOURCE MANAGEMENT RECOMMENDATIONS

6.004 The Channel Maintenance and River Resource Management Recommendations proposed by GREAT I require further actions and studies by member States and agencies. Many of these actions require preparation of additional environmental documents in the form of assessments or impact statements at the time of implementation. The following table indicates whether or not the recommendations are expected to require additional environmental documents. The final decision on the need for these documents is up to the implementing agency or State.

TABLE 6 ADDITIONAL ENVIRONMENTAL DOCUMENTS  
REQUIRED BY CHANNEL MAINTENANCE AND RIVER RESOURCE  
MANAGEMENT RECOMMENDATIONS

Recommendation Number	Recommendation	Probable Future Environmental Documents	Probable Agency(ies)
Channel Maintenance			
A3	Main stem shoreline protection	EIA on specific stabilization projects	Corps
A4	Reduced depth dredging	None	----
A5	Purchase of efficient dredging equipment	None	----
A6	Quantitative floodplain impact evaluation	None	----
A7	Emphasize beneficial uses of dredged material	None	----
A8	Temporary placement and emergency sites	EIA prepared when site is proposed for use	Corps
A9	Water quality impact evaluations	None	----
A10	Placement site development plans	EIA prepared when plan developed	Corps
A11	Chippewa River sediment control	EIA prepared when specific action is proposed	Corps
PF1	Congress continue authorization of maintenance of navigation channel	None	----
PF2	Provide funds to implement CMP	None	----
PF3	Emergency dredging definition	None	----

Recommendation Number	Recommendation	Probable Future Environmental Documents	Probable Agency(ies)
PF4	Maintain emergency dredging capability	None	----
PF5	Sale of dredged material	None	----
PF6	Acquisition of private land for dredged material disposal	None	----
PF7	Modify State laws and regulations to allow CMP implementation, fish and wildlife projects and recreation projects	None	----
PF8	Depth of channel definition	None	----
FS1	Demonstration dredging projects	EIA prepared on each demonstration project	Corps
FS2	Investigate river sediment transport capability	EIA prepared if action proposed	Corps
FS3	Development of sediment transport models	None	----
FS4	Monitor tributary deltas	None	----
FS5	Wing dam repair and/or modification	EIA prepared for specific modification	Corps
FS6	Low-head tributary dams	EIA prepared if action proposed	Corps
FS7	Dredging by sand and gravel companies	None	----
FS8	Monitoring water quality impacts - develop criteria	None	----
FS9	Tributary streambank erosion control	EIA prepared on specific actions	Corps SCS
FS10	Sediment control on Wisconsin streams entering Pool 3	EIA prepared on specific actions	Corps SCS
FS11	Riverine placement study	EIA prepared on specific actions	Corps
FS12	Remove material from floodway	EIA prepared on specific actions	Corps



Recommendation Number	Recommendation	Probable Future Environmental Documents	Probable Agency(ies)
FS13	Transport material to areas of high demand	EIA prepared on specific actions	Corps
FS14	Private enterprise removal of material	None	----
FS15	Make riprap with dredged material	None	----
FS16	Beneficial use of organic sediment	None	----
<b>Sediment and Erosion Control</b>			
A12	Increase upland soil erosion control practices	None	----
FS17	Conservation tillage program	EIA when specific program elements proposed for implementation	SCS
FS18	Monitor sediment inflow	None	----
<b>Water Quality</b>			
A13	Regulations on shipping hazardous materials	None	----
A14	Sanitary trash pickups and pumpout facilities	None	----
<b>Fish and Wildlife</b>			
A15	Increase staff and budget allocations	None	----
A16	Culvert at L/D 4	EIA when action proposed for implementation	Corps
A17	Culvert at L/D 10	EIA when action proposed for implementation	Corps
A18	Continue Bicentennial Land Heritage Program	None	----
PF9	Master Plan for Upper Mississippi Wildlife and Fish Refuge	EIA prepared in conjunction with plan development	FWS
PF10	Manage river as an ecological unit	None	----

Recommendation Number	Recommendation	Probable Future Environmental Documents	Probable Agency(ies)
PF11	Provide Corps with authority to assist with fish and wildlife and recreation projects	None	----
PF12	Separate line items on budgets	None	----
PF13	User data for cost allocations	None	----
PF14	Develop unified management objectives	None	----
PF15	Introduction of non-native species	EIA prepared if organism proposed for introduction	FWS States
FS19	Backwater protection study	EIA prepared if specific actions result from study	FWS Corps States
FS20	Island creation in backwaters study	EIA prepared if specific actions result from study	FWS Corps States
FS21	Weaver Bottoms rehabilitation (Pool 5)	EIA prepared when implementation proposed	FWS Corps Minnesota
FS22	Finger Lakes as physical model	None	----
FS23	Reduce fine sediment flow into Big Slough (Pool 9)	EIA prepared when implementation proposed	FWS Corps Iowa
FS24	Lake Onalaska rehabilitation (Pool 7)	EIA prepared when implementation proposed	FWS Corps Wisconsin
FS25	Spring Lake rehabilitation (Pool 2)	EIA prepared when implementation proposed	Corps Minnesota
FS26	Monitoring at Kruger Slough and Island 42	None	----
FS27	Mapping of aquatic features	None	----
FS28	Pool level control for fish and wildlife	EIA prepared if substantial change in current operation procedures proposed	Corps
FS29	Designate primitive or natural areas	None	----

Recommendation Number	Recommendation	Probable Future Environmental Documents	Probable Agency(ies)
FS30	Forest land management study	None	----
FS31	Bottomland hardwood management study	None	----
FS32	Life histories of fishes	None	----
FS33	Opening side channels at Blackhawk State Park (Pool 9)	EIA prepared when implementation proposed	Corps FWS Wisconsin
Aesthetics			
PF16	Scenic easements	None	----
FS34	Consider aesthetics in management plans	None	----
Commercial Navigation			
PF17	Amendment to Bridge Act	None	----
PF18	Rebuild obstructive bridges	EIA prepared	----
FS35	Regulatory requirements study	None	----
FS36	Fleeting area study	None	----
FS37	Mark channel in Lake Pepin	None	----
FS38	Capacity limitations L/D 2 and L/D 3	EIA prepared if actions proposed for implementation	Corps
FS39	Navigational Aid System assessment	None	----
Recreation			
A19	Primitive recreation sites	EIA prepared when site-specific actions proposed	Corps
A20	Lockage waiting areas	EIA prepared when specific areas proposed for development	Corps

Recommendation Number	Recommendation	Probable Future Environmental Documents	Probable Agency(ies)
A21	Recreational facility guides	None	----
A22	Uniform recreation signing	None	----
A23	Marking control structures	None	----
A24	Uniform boat noise levels	None	----
A25	Bikeway	EIA prepared when implementation proposed	FHWA States
A26	Canoe trails	EIA prepared when implementation proposed	Corps FWS States
A27	Ft. Snelling back channel	EIA prepared when implementation proposed	Corps
A28	Boater education - State and Federal agencies	None	----
A29	Boater education - boating clubs	None	----
A30	Boater education - rental agencies	None	----
A31	Increase water patrol	None	----
A32	Trash packout program	None	----
PF19	Enforce boathouse permits	EIA prepared on each permit application	Corps
PF20	Monitor application of lockage regulations	None	----
PF21	Discourage high impact recreational developments	None	----
PF22	Cooperative recreation data surveys	None	----
PF23	Provide diversity of recreational opportunities	None	----

Recommendation Number	Recommendation	Probable Future Environmental Documents	Probable Agency(ies)
PF24	Maintain boat-launching accesses	EIA prepared for site-specific actions	Corps FWS States
FS40	Recreation master plan	EIA prepared in con- junction with master plan preparation	Corps
FS41	Feasibility of recreation projects	EIA prepared when pro- ject proposed for implementation	Corps States
FS42	Water zoning investigation	None	----
FS43	Impact of private leases on Federal lands	EIA prepared on lease applications	Corps
Floodplain Management			
A33	Topo- and hydrographic mapping	None	----
A34	Address project-induced sediment and flood flow impacts	None	----
PF25	Uniform floodplain manage- ment standards	None	----
FS44	Mathematical floodplain management models	None	----
Cultural Resources			
FS45	Comprehensive cultural resource inventory	None	----
Public Participation			
A35	Information and education programs	None	----
Ongoing Planning and Coordination			
A36	Coordination of implementa- tion of GREAT I recommenda- tions	None	----
A37	Coordination mechanism	None	----

A 38	Minnesota-Wisconsin Boundary Area Commission monitor implementation of GREAT I recommendations	None	-
A 39	Total river resource management plan	EIS prepared in conjunction with plan preparation	UMRBC
PF 26	UMRBC guidelines for monitoring GREAT	None	-
FS 46	Geographic Information System	None	-
FS 47	Document land ownership	None	-

Abbreviations:

<u>A</u>	- Action Item
<u>CMP</u>	- Channel Maintenance Plan
<u>EIA</u>	- Environmental Impact Assessment
<u>EIS</u>	- Environmental Impact Statement
<u>FHWA</u>	- Federal Highway Administration, U.S. Department of Transportation
<u>FS</u>	- Further Study Item
<u>FWS</u>	- Fish and Wildlife Service, U.S. Department of the Interior
<u>L/D</u>	- Lock and Dam
<u>PF</u>	- Policy/Funding Item
<u>SCS</u>	- Soil Conservation Service, U.S. Department of Agriculture
<u>UMRBC</u>	- Upper Mississippi River Basin Commission

# INDEX\*

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\*This is a preliminary index because all of the GREAT I documents were not printed when the EIS went to print. A more detailed index citing page numbers will be prepared and circulated to statement recipients when all the GREAT I documents have been printed.

## Abbreviations:

CM - Channel Maintenance Appendix  
CTWG - Commercial Transportation Work Group Appendix  
DMUWG - Dredged Material Uses Work Group Appendix  
DRWG - Dredging Requirements Work Group Appendix  
FPMWG - Floodplain Management Work Group Appendix  
PFWG - Plan Formulation Work Group Appendix  
PPWG - Public Participation Work Group Appendix  
RWG - Recreation Work Group Appendix  
SEWG - Sediment and Erosion Work Group Appendix  
WQWG - Water Quality Work Group Appendix

COMMENTS/RESPONSES





UNITED STATES  
ENVIRONMENTAL PROTECTION AGENCY  
REGION V  
230 SOUTH DEARBORN ST.  
CHICAGO, ILLINOIS 60604

REPLY TO ATTENTION OF:

RESPONSES TO COMMENTS ON THE GREAT I DRAFT EIS

Mr. Gary Paleah  
GREAT I EIS Coordinator  
U.S. Army Engineer District, St. Paul  
1135 U.S. Post Office and Custom House  
St. Paul, Minnesota 55101

26 MAR 1980

RE: 80-013-190  
D-COE-F35029-00

Dear Mr. Paleah:

We have completed our review of the Draft Environmental Impact Statement (EIS) for the River Resource Management Plan of the Great River Environmental Action Team (GREAT) I dated September 1979. The EIS deals with development of a river resource management plan for the Upper Mississippi River from Guttenberg, Iowa, to the Head of Navigation at Minneapolis, Minnesota. The most significant problems concerning the resources of the river within the study area that were identified and addressed are: (1) disposal of dredged material from maintenance of the 9-foot navigation channel; (2) sedimentation in the backwaters, sloughs, and lakes of the Upper Mississippi River; and (3) conflicting demands being placed upon the resources of the study area - primarily by recreation, commercial transportation, and fish and wildlife interests.

The generic nature of the Draft EIS provides a necessary guide for a comprehensive river resource management plan which will protect, for the future, the economic wealth, aesthetic beauty, fish and wildlife resources, and recreational potential that the river provides. Compliance with the existing environmental regulatory framework will assure that environmental considerations within our expertise and jurisdiction will be observed.

The Corps of Engineers must comply with the requirements of Section 404 of the Federal Water Pollution Control Act in any action involving the placement of fill or discharge of dredged material into "the waters of the United States." We request the continuance of notice being given to our Regional Administrator annually, before use of any disposal site. Additionally, State Certification must be attained each year unless waived or multiyear certification has been provided. This regulatory framework can be complemented by the information that has been gathered by the GREAT I team, so that the river resources can be utilized to their fullest extent and in an environmentally compatible manner.

Along with the obvious advantages of having a solution to the problem of finding acceptable disposal sites until the year 2025, we think that the GREAT I team's assessment of sediment and erosion problems is vital to not only reducing the magnitude of dredging problems, but also to protecting

1. No response necessary.
2. We concur. GREAT I has no responsibility pertaining to the Corps public notices. We expect that the Corps will continue to forward notices to you as they have in the past. You may wish to contact them directly on this matter, however.
3. We concur.

one of our nation's most valuable resources; the soil. Application of existing upland erosion control practices should be accelerated to the maximum extent possible. The acceleration of the application of existing land treatment practices would decrease erosion from agricultural areas, and result in reduced sediment deposition in the river's channel and backwaters, as well as conservation of the valuable soil resource base.

3. Cont.

4. Substantial additional information has been added to the final EIS to evaluate more fully the impacts of the GREAT I recommended actions.

In accordance with our responsibility to inform the public of our views on proposed Federal actions under Section 309 of the Clean Air Act, we have classified our comments as LO-2. Specifically, this means that although we lack objections regarding the environmental impact of the proposed action, we find that insufficient information is available to fully assess the total environmental impacts which would occur if the suggested course of action is fully implemented. We assign this rating with the understanding that the existing regulatory framework will provide the means for obtaining the necessary information as implementation is accomplished. The classification and date of our comments will be published in the Federal Register. If you have any questions regarding our categorization procedures or comments, please contact Rick Pitorak of my staff at 312/886-6689.

4.

Sincerely yours,

*William D. Franz*

Barbara J. Taylor, Chief  
Environmental Impact Review Staff  
Office of Environmental Review



## United States Department of the Interior

OFFICE OF THE SECRETARY  
WASHINGTON, D.C. 20240

ER 79/1103

APR 22 1980

Mr. Wayne Knott, Co-Chairman  
Great River Environmental Action Team  
U.S. Army Corps of Engineers  
1135 U.S. Post Office and Court House  
St. Paul, Minnesota 55101

Dear Mr. Knott:

Thank you for requesting the Department of the Interior's comments on the draft GREAT I Report, Upper Mississippi River from Head of Navigation to Guttenberg, Iowa, and the Draft Environmental Impact Statement (D-EIS). We have carefully reviewed the documents and offer the following comments and suggested revisions.

### GENERAL COMMENTS

We believe the study makes a significant contribution toward the identification and solution of problems encountered by the multiple use of the resources of the Upper Mississippi River System. The findings should be useful to the Upper Mississippi Level B Study and should be incorporated into the Upper Mississippi River Basin Commission's comprehensive Master Plan for the management of the Upper Mississippi River System.

The channel maintenance plan portion of the GREAT Report is the most definitive section. Subject to satisfactory resolution of concerns about individual disposal sites, overall provisions for fish and wildlife habitat mitigation, and other items as detailed in Attachment I, we believe the channel maintenance plan is environmentally acceptable. We support the recommendation that fish and wildlife conservation, as well as recreation, be included as project purposes of the 9-foot navigation channel project, provided that all measures carried out under these purposes are coordinated fully with all agencies having resource management responsibilities in the area. The significance of this provision is illustrated by the fact that the Upper Mississippi River Wildlife and Fish Refuge and the Minnesota Valley National Wildlife Refuge have primary authority over fish and wildlife resources on refuge areas, as designated by the Congress. The U.S. Fish and Wildlife Service, therefore, must retain approval authority for fish and wildlife conservation and recreation actions or refuges. Any actions on the refuges must be in concurrence with legislative mandates for the areas. We also strongly support the recommendations for obtaining improved equipment and using more appropriate methods so that dredged material can be disposed of with less detrimental effects. Similarly, we heartily concur with those recommendations addressing the need for minimizing erosion from stream banks and in upland areas of contributing watersheds.

5. The point is clarified in the final EIS; see Sections 2 and 6.

A number of key issues are not treated adequately in the Report and the D-EIS. Fishery resource values are not adequately addressed from either the economic or sport viewpoint. Endangered species consideration should have been more thoroughly integrated. Also, the Report touches on many areas of concern where the jurisdiction of other agencies, including the Fish and Wildlife Service, should be more clearly recognized.

The focus on water quality problems in the GREAT I Report was largely related to operation and maintenance and sediment. The role of water quality factors, other than sediment, in limiting fish, wildlife and recreation values on the river and the possibilities for future water quality improvements should be considered in future studies such as the comprehensive Master Plan for the Upper Mississippi River System (P.L. 95-502). Specific details of these and other concerns are contained in the attachment.

Another concern we have with the Report and the D-EIS is the implication that the Great River Study Committee of the Upper Mississippi River Basin Commission (URBSC) or some other similar interagency committee should become the predominant coordination and management agency on the Upper Mississippi River (CR23, 25, NR7, 22, 28, 31, 32, 33, 39, 47, 48 and SE19 and 31). While we agree that more coordination between agencies having management jurisdiction is highly desirable and vital to improved future management of the Upper Mississippi River System and that various institutional arrangements be explored, it would be premature to suggest that any one group should become the dominant management force on the river. We agree that the coordination function can be acceptably accomplished by the GREAT River Study Committee of the URBSC. The final GREAT Report should specify additional details on how the interagency coordination would be conducted.

A major issue that the GREAT Report did not address is placing limits on development along the Upper Mississippi River. The Department believes that this ultimately may be a useful device available to stabilize resource values and provide for continued future high quality fish and wildlife populations in the area. We request that this be included as a recommendation for intensive study and wide public participation in connection with the Master Plan. If barge traffic, fleeting areas and associated uses increase significantly beyond the present level, a decline in resource values very likely will result.

Our most important concern with the Draft Report and D-EIS is the differential in planning intensity, alternative analysis and implementability between the channel maintenance plan and the natural resource and socio-economic recommendations. While the channel maintenance plan is reasonably complete and ready for decision and implementation, the natural resource and socio-economic recommendations are largely programmatic in nature and will remain so until additional study and evaluation have been completed. This will not

6. The discussions of the Channel Maintenance Plan and the River Resource Management Recommendations have been separated as much as possible in the final EIS. We believe that separate EIS's or assessments for these two products of GREAT would not be in keeping with the intent of the National Environmental Policy Act (NEPA).

7. No response necessary.

occur until the agencies with direct management responsibilities supplement the GREAT planning effort by completing a coordinated general Master Plan for the area. Since this has not occurred, we believe that the format for the GREAT Report should be changed substantially to make the dichotomy clear.

5. Cont.

In its present form, there is a substantial risk that the GREAT Report might be interpreted as a comprehensive plan for resource management of the Upper Mississippi River. Portions of the preface, introduction and background section of the Main Report Draft suggest that this was indeed the initial intent of the five-year study. In fact, as other portions of the document clearly recognize, the scope of the GREAT study was reduced to the development of a channel maintenance plan and a series of recommendations for the management of commercial transportation, fish and wildlife, and recreation resources. Given the limitations in time and money, the complexities of the resources, and the jurisdictional complications, we believe that the decision to limit the GREAT study objectives was prudent. In keeping with that, the Report format should be changed in a parallel fashion to much more clearly reflect the more limited objectives that were achieved.

We suggest that the final GREAT Report and Appendix be separated into:

- 1) a plan and EIS for channel maintenance on the Upper Mississippi River and
  - 2) a report of recommendations on natural resources, recreation and socioeconomic management to be considered in the Master Plan for the Upper Mississippi River with any accompanying EIS identified as programmatic only.
- With suitable changes to reflect specific concerns from commenting entities, the channel maintenance plan and EIS would be the basis for an environmentally sound and reasonably acceptable way of performing this essential task. With the channel maintenance plan relatively "set in place," other organizations would be in a much better position to complete and coordinate their various master planning efforts on other land areas along the Upper Mississippi River.

6.

The discussion of historic and archeological resources in the Main Report and D-EIS generally appears adequate for the study at this level. The Corps has recognized its more specific responsibilities for historic and archeological resources under Executive Order 11593 and Section 105 of the National Historic Preservation Act, as amended (D-EIS, p. 65). Future documents prepared for channel maintenance and other GREAT I actions should document the results of literature searches and in-depth field surveys for project-specific actions, as they become available.

7.

Particular care should be taken to ensure that channel maintenance activities within the Lower Saint Croix National Scenic River are conducted to enhance public outdoor recreation opportunities. Dredged material suitable for open disposal should be placed to enrich public rather than private beaches. Rip-rap, which makes disposal sites unacceptable for boating and swimming, should not be placed on such sites within the Lower Saint Croix National Scenic River. The Department will cooperate with the U.S. Army Corps of

Engineers in resolving any problems which involve the Lower Saint Croix National Scenic River and the Effigy Mounds National Monument.

In its brief discussion regarding potential wilderness designations in the Upper Mississippi Basin, the GEAR I Report dismissed the desirability of such designations because they "would restrict needed management actions." At the same time, it is acknowledged that wilderness designations could protect some portions of the river basin from such intrusions as power line and road construction, and dredge-spoil deposition. There is no evidence that GEAR I conducted a thorough examination of how wilderness or some other designation, particularly within the Upper Mississippi Wildlife and Fish Refuge where wilderness-quality lands have been identified, could preclude unwanted intrusions and at the same time provide a reasonable degree of flexibility to allow for needed and necessary resource management. Consideration must be given to wilderness in the management plan being developed by the UMWBC in accordance with P.L. 95-502. In view of this legal mandate and in view of the considerable interest in affording greater protection for unusual resource values in the Upper Mississippi Basin, there is a need for further, more detailed consideration of the wilderness issue.

#### SPECIFIC COMMENTS

It should be clarified as to whether the proposed plan has been assessed for compliance with Executive Order 11990, Protection of Wetlands.

The U.S. Geological Survey is shown as the agency responsible for implementing recommendation WRI2 on page C-3 in the Appendix of the Main Report Draft. Instead, the agency should be shown as being responsible for recommendation WRI3, as indicated on page 171 of the Main Report Draft.

The description of the Heritage Conservation and Recreation Service's responsibilities on pages 50-51 of the Recreation Work Group Appendix is incorrect. The National Park Service now has the responsibility of undertaking studies of the suitability of appropriate areas for designation as national parks, national recreation areas, wild and scenic rivers, and national scenic and historic trails. The Appendix should be corrected to reflect the change.

The Corps should note, in conjunction with its impact analysis of "Improved navigation through enforced drawbridge regulations and removal of obstructive bridges" (p. 115), that historic bridges on or eligible for the National Register may be encountered. Consideration should also be given to the presence of shipwrecks and other potential underwater historic and archeological resources in future in-depth studies.

There are numerous Land and Water Conservation Fund project sites in the GEAR I study area, many of which are located along the Mississippi River.

8. Generally, dredged material disposal along the Upper Mississippi River has no groundwater impact because of the prevalence of uncontaminated material. In the final EIS, those sites where groundwater contamination may be a problem are identified in the site-specific discussions.

9. No impact on these features from GREAT I recommended actions has been identified. Because many of the GREAT I recommended actions are general, future implementation of the recommendations may have an impact on these areas. Any such impacts must be addressed in the environmental documents for these site-specific actions.

10. No impact on these rivers from GREAT I recommended actions has been identified. Because many of the GREAT I recommended actions are general, future implementation of the recommendations may have an impact on these areas. Any such impacts must be addressed in the environmental documents for these site-specific actions.

Project-specific actions should document impacts to these Federally-assisted parks and recreation facilities.

If any land acquired or developed with Land and Water Conservation Fund assistance is needed for GREAT I proposed actions, the provisions of Section 6(f) of the Land and Water Conservation Fund Act may apply. For up-to-date listings of Fund-assisted facilities in the study area, you should contact: for Minnesota - Ms. Anonell Hagen, Assistant Commissioner for Planning, Department of Natural Resources, 301 Centennial Building, Box 11, St. Paul 55155; for Wisconsin - Mr. Paul N. Guthrie, Jr., Director, Office of Intergovernmental Programs, Department of Natural Resources, Box 7921, Madison 53707; and for Iowa - Mr. Robert Egerland, Acting Director, Iowa Conservation Commission, Wallace Street Office Building, East 9th and Grand, Des Moines 50319.

Additional comments on and concerns about individual recommendations and sections of the Report are detailed in Attachment I.

#### COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT

We offer the following comments on the D-EIS to supplement the concerns delineated under "General Comments."

The D-EIS should assess, at least in a general manner, the potential for impacts on groundwater quality from dredging and dredged materials disposal, either on floodplains or in upland areas. Various types of rocks and sediments should be considered in the assessment; movement of water and retention of pollutants will be related to physical and physiochemical factors of the various types. (See the Water Quality Appendix, page 19.)

Two National Natural Landmarks, Chippewa River Bottoms (at the mouth of the Chippewa River in Buffalo County, Wisconsin) and Wyalusing Hardwood Forest (near the town of Wyalusing in Grant County, Wisconsin), as well as the following National Historic Landmarks, may be affected by the recommended actions: Villa Louis, Second Fort Crawford, Astor Fur Warehouse, Brishols House, and DuSman Hotel (all in Prairie du Chien, Wisconsin) and Fort Snelling in Twin Cities, Minnesota. The final environmental statement should discuss the impacts, if any, on these sites.

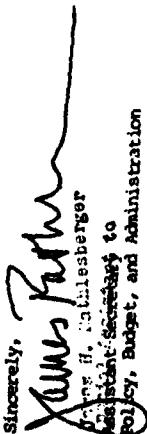
It should be noted that the Wisconsin River from near Sauk City to the Mississippi River is under study for inclusion in the National Wild and Scenic Rivers System. Additionally, several rivers in the study area are included in the National Rivers Inventory: The Black River (in Trempealeau and La Crosse Counties, Wisconsin) are Category I Rivers, and the Zumbro River (Mankato County, Minnesota), the Root River (Houston County, Minnesota) and the Mississippi River (between the Iowa State line) are Recreational of the rivers. The final environmental statement should include a discussion of the

-6-

pects, if any, on the above rivers.

Thank you again for the opportunity to review the documents. I hope you find our comments and recommendations helpful.

Sincerely,

  
James H. Mulliesberger  
Assistant Secretary to  
Policy, Budget, and Administration

Attachment 1



to prevent degradation of habitat and wildlife use. This recommendation should be recorded to read, "in or near area identified as exceptionally good for hunting, trapping, and fishing or closed refuge areas."

- 82 41 Public education programs are essential but must be coupled with adequate enforcement of regulations.

#### SPECIFIC COMMENTS ON THE DRAFT EIS

The following comments should be addressed and adjustments made for the development of an adequate environmental statement.

11. Page 78- There are inconsistencies between the recommended alternative dredged material disposal sites presented in the draft main report, channel maintenance appendix and the draft EIS.

12. 2.004 & 2.092 Recommendations regarding recreation site specific actions are not the only site specific recommendations presented in the draft main report (i.e. NR 2). The narrative indicates otherwise.

13. 2.012 The acronym USAF should be defined.

14. 3.044 Locking capacity, availability of fleeting areas and docking facilities would seem to be factors limiting the capacity of the river for commercial transportation. A more meaningful statement would identify what the capacity for commercial transportation is within these physical restraints rather than to subjectively say that the river is "grossly underused".

228

15. 4.005 There is no explanation as to what Type (I, II, III or IV) the wetlands are or where the main channel border is found. The report must be supplemented with this information.

16. 4.027 & 4.028 The narrative implies that the more dredging that is accomplished, the greater the benefit regardless of need. It would be more appropriate to state that not dredging the navigation channel would adversely impact commercial transportation.

17. 4.029 Is it reasonable to assume that the more a disposal site costs, the less funds will be available for channel maintenance elsewhere?

18. 4.040 A more detailed description of the beneficial uses of dredged material should be provided or referenced.

#### Endangered Species

The DRAFT I draft final report does not adequately describe the presence or status of endangered or threatened species existing within the study area or describe the impact of the proposed actions on these species. We propose that the following section be included in the description of the resource:

11. These were editorial errors in both the draft main report and the draft EIS. These type of errors have been corrected in the final documents.

12. This discrepancy has been corrected in the final EIS.

13. This acronym is identified as Upper St. Anthony Falls in the text.

14. This statement is revised as suggested. See paragraph 3.104 of the final EIS.

15. Because the wetland classifications are generally common knowledge among specialists, there is no need to repeat verbatim the definitions from the U.S. Fish and Wildlife Service Circular 39. Definitions of main channel border habitat and other study area habitats are found in paragraphs 3.019-3.051 of the final EIS.

16. The referenced paragraph has been modified to alleviate the potential misunderstanding.

17. The referenced paragraph has been deleted.

18. The Dredged Material Uses Appendix is referenced for a discussion of beneficial uses (page 92).

UNITED STATES DEPARTMENT OF AGRICULTURE  
FOREST SERVICE  
NORTHEASTERN AREA STATE AND PRIVATE FORESTRY  
370 NEED ROAD - BRIDGEMAN, PA. 19008  
(215) 596-1672

1950  
January 28, 1980



Mr. Wayne Knott  
St. Paul District  
U.S. Army Corps of Engineers  
1135 U.S. Post Office  
2 Custom House  
St. Paul, MN 55101

Re: Great I Report and  
Draft Environmental Statement  
Upper Mississippi River

Dear Mr. Knott:

We can add little to the 52 National Resource Management Recommendations in the main Draft Report. Certain Recommendations, however, appear to us to have the greatest long-range effect in preserving the Rivers' natural resources. One is a Land Treatment program (NR10) to reduce resedimentation of the riverbeds from agricultural type of erosion.

If land treatment reduces the flow of sediment (p 8-15) the rivers tend to pick up sediment elsewhere. Perhaps land treatment could be made part of a study of river dynamics.

We agree that an update of vegetative inventory (p 8-15) will be needed, with the intent of adjusting dredge and fill procedures to changing wildlife situations.

Natural Resource Conclusions (p 8-14) refer to reduction of sediment by partial closing dams. We should like the Final Statement to show how much sediment is involved; and in what way habitat maintenance is improved.

Do these partial closing dams maintain the water level in the backwater areas or do they allow two-way flow? Will

the depth of backwater areas decrease if main channel dredging increases river flow? If so, the partial closing dams should provide directional flow control, to protect fish and wildlife habitat in the backwaters.

Spillage of diesel fuel and other petroleum substances could lead to suffocation of certain water-dwelling mammals, such as muskrat, particularly when the rivers and backwaters are covered with ice.

Some of the dredged spoil could be so placed as to provide a base for new wetland vegetation, thus replacing similar vegetation lost by inundation and construction.

Since much of the spoil will be deposited out of the flood plain, some bottomland hardwood stands may be affected. In the Final Environmental Statement we feel that a section on woodland should be added to the sections on flood plain, water quality etc., where appropriate.

We believe that the use of vegetation should be an important part of streambank erosion control (Main Draft - IRI4). In certain locations suitable trees and shrubs such as alder, willows and elder can be used to hold the soil better than artificial material, or can serve as supplemental measures, as shown in page 75 of the recreation work group Appendix.

In general, if guidelines developed by various interdisciplinary work groups are followed, our interests in preservation and use of woodland will be represented.

Thank you for the opportunity to review this report and statement.

DALE O. VANDENBURG  
Staff Director  
Environmental Quality Evaluation

19. Timber harvesting is not a major commercial enterprise in the Upper Mississippi River floodplain, and the GREAT I study did not delve into this subject. We feel that this is not a major issue in the study area and that the addition of a separate section on woodlands would not improve the document.

U.S. DEPARTMENT OF TRANSPORTATION  
FEDERAL HIGHWAY ADMINISTRATION

REGION 5  
18208 DALE HIGHWAY  
NORWOOD, ILLINOIS 60430  
January 9, 1980

20. No response necessary.

IN REPLY REFER TO  
HED-05

Mr. Wayne Knott  
St. Paul District  
U.S. Army Corps of Engineers  
1135 U.S. Post Office & Custom House  
St. Paul, Minnesota 55101

Dear Mr. Knott:

The draft environmental statement for the Mississippi River  
Resource Management Plan has been reviewed and we have no  
substantive comments to offer on the document.

Sincerely yours,

Donald E. Trull  
Regional Administrator

By: *W. G. Enrich*  
W. G. Enrich, Director  
Office of Environment and Design

20.



State of Wisconsin / DEPARTMENT OF NATURAL RESOURCES

Anthony S. Earl  
Secretary  
BOX 7921  
MADISON, WISCONSIN 53707

February 22, 1980

IN REPLY REFER TO: 1660-1

Mr. Gary Paleash  
GREAT I EIS Coordinator  
Environmental Resources Branch  
St. Paul District, Corps of Engineers  
1135 U. S. Post Office and Custom House  
St. Paul, MN 55101

Dear Mr. Paleash:

The Department is currently reviewing the Draft Environmental Impact Statement (DEIS), River Resource Management Plan, GREAT I. We intend to submit detailed comments on the DEIS after we complete our review. However, we believe some major organizational problems deserve your immediate attention.

21. Basically, the Draft EIS has three primary problems. First, the Resource Management Recommendations are not correlated to specific needs. Second, 22. alternatives are not presented for each resource management need or objective. And third, none of the recommendations are evaluated for 23. cumulative impacts and relationships to other recommendations. Thus, the Draft EIS is not in conformance with CEQ regulations and the intent 24. of NEPA. To bring the Draft EIS into conformance, major changes are needed.

We recognize that preparing an EIS on such a broad resource management plan such as the GREAT I report is very difficult. However, the difficulty of the task does not preclude the need to satisfy the intent of NEPA and the requirements of CEQ. Complicated projects like GREAT I especially need the scrutiny of a NEPA review to clarify the maze of issues. Recognizing this, CEQ regulations provide a guide for EIS development through even the most complicated projects.

As you know, CEQ regulation 1502.4 requires that closely related proposals, such as the GREAT I recommendations, be addressed in a single environmental impact statement in order to look at the interaction and combined impacts of the recommendations. Portions of the GREAT I report already follow CEQ guidance by arranging the site specific recommendations geographically. The remaining general recommendations should follow the normal CEQ/EIS procedures by being grouped by need, purpose, or objective

21. The resource management recommendations were correlated with resource needs in the main report. The resource needs were incorporated by reference in paragraph 2.096 of the draft EIS because they were too voluminous to re-print in full. Additional notations are used in the final EIS to assist in the cross-referencing between the main report, appendices, and the EIS.
22. The GREAT I team did not develop formal alternatives for river management needs or objectives in the development of recommendations. Alternatives were discussed at the work group and team levels but were never formally documented. Therefore, the only documentable alternative to each recommendation is the no action alternative. This point is explained in the EIS in paragraph 2.015, page 20.
23. Cumulative impacts are discussed in the final EIS (see section 4).
24. We believe that the GREAT I final EIS is in conformance with the intent of the National Environmental Policy Act (NEPA) and Council on Environmental Quality (CEQ) regulations.
25. We concur.
26. The GREAT I recommendations are grouped as much as possible by subject matter. Considering the large number of topics and the occasional overlapping of subject matter, it is not possible to develop a grouping that would satisfy all needs.

rather than the artificial classifications of CM, SE, NR or by the categories of implementation, further study, or policy which are arbitrary and may change. This is analogous to grouping the recommendations as if a number of separate EIS's were to be prepared. Obviously however, you should not go as far as to separate the EIS into totally distinct pieces. Instead, you should unify these groups by first identifying all related recommendations or recommendations with related impacts. For instance, several resource management recommendations have direct impacts on the channel maintenance plan. Also, a few site specific recommendations were left isolated from other recommendations referring to the same geographical area. These related recommendations should be identified.

26.  
Cont.

Once the recommendations have been described and related recommendations identified, the EIS can proceed in the normal fashion to evaluate the primary and secondary impacts. This evaluation should include a discussion of the impacts associated with: a) this recommendation alone, b) this recommendation combined with other recommendations, c) the impact of this recommendation on other recommendations, and d) the impact of other recommendations on this recommendation.

27.

The result should be a concise, manageable EIS that sharply defines the issues and provides a clear basis for a choice among the options. Furthermore, the revised EIS would tie all GREAT I recommendations, both channel maintenance plans and resource management recommendations, together into one inter-related and unified management plan.

28.

We understand that these changes will constitute a major work effort on your part. That is why we are providing you with these comments at this time. However, we sincerely believe these changes are needed to rationally evaluate the GREAT I report, and to satisfy the requirements of NEPA.

Sincerely,

Bureau of Environmental Impact

*Howard S. Druckemiller*

Howard S. Druckemiller  
Director

cc: Wayne Krott - COE  
John Wolfelin - FWS

27. Impacts of the recommendations, singly and in combination, are discussed in section 4 of the EIS. We do not believe that discussing the impacts of recommendations upon recommendations is necessary. The important cumulative or antagonistic relationships should be evident in the discussion of combined impacts.

28. No response necessary.



State of Wisconsin / DEPARTMENT OF NATURAL RESOURCES

Anthony S. Earl  
Secretary  
DOY 1221  
MADISON, WISCONSIN 53707

April 1, 1980

IN REPLY REFER TO: 1660-1

Mr. Gary Paleh  
GREAT I EIS Coordinator  
St. Paul District, Corps of Engineers  
1135 U. S. Post Office and Custom House  
St. Paul, Minnesota 55101

Dear Mr. Paleh:

We have completed our review of the GREAT I Draft Environmental Impact Statement (DEIS) and suggest the following changes:

General

1. As stated in my February 22, 1980 letter, the Draft EIS suffers from three primary organizational problems. To resolve these problems the EIS should:

- a. Explicitly relate Resource Management Recommendations (RMR) to project or resource needs,
- b. Present functionally equivalent alternatives to satisfy project or resource needs, and
- c. Consider and evaluate the combined impacts of the many recommendations

2. The purpose and use of the main report and EIS should be explicitly stated. The EIS should briefly outline the intended approval and adoption steps for the main report and indicate the decision point(s) that the final EIS must precede.

3. The EIS should recognize all recommendations presented in the GREAT I report besides those presented in the main report "Recommendations" chapter. Recommendations also appear in the "Implementation" chapter on pages 228-233, the Channel Maintenance Appendix (CMA) on pages 226, 278, 365, 445, 550, 621, 675, 727, 782, 871, and 969, and the Recreation Work Group Appendix (as already noted in the Draft EIS). Note that many but not all of the site specific recommendations are repeated in the Recreation Appendix, CMA, and RMR-SE 3 and SE 21.

29. See responses to comments 21, 22, and 27.
30. This information is presented in the Summary and Section 6 of the final EIS.
31. The GREAT I recommendations have been reorganized, and all are presented in the final EIS on pages 20-41.

4. The "Affected Environment" chapter should be expanded to provide the reader with enough information to understand the effects of the alternatives. For instance, the discussion on the resource and habitat changes due to channelizing the river should describe the progressive changes in the resource as first the wing dams and then the locks, dams and dredge spoil disposal sites stabilized the channel, created pools and blocked circulation in side-channel areas. These features and their inherent characteristics which are all a part of a controlled river system should be contrasted to a natural free flowing river system to accent the need for the various proposed habitat mitigation recommendations and to clearly define the "conflicting use" issues. The referenced Fish and Wildlife Work Group Appendix material approaches this type of discussion, but it rambles and lacks an integrated discussion of changes in recreation potential. This referenced material should be reorganized, supplemented, consolidated and presented directly in the EIS.

As stated in CEQ 1702.15, "concentrate efforts and attention on important issues", provide the information that "is necessary to understand the effects of the alternatives", and continue to "avoid useless bulk."

Also, this chapter should vividly describe current dredging and disposal operations so the reader can clearly understand implementation of the proposed Channel Maintenance Plan. This discussion should also address current a) operational constraints (both physical and legal), b) frequency of "emergency" dredging, c) types and frequency of disposal site problems/failures, and d) estimates of the depth to which the river would stabilize if maintenance dredging did not occur (a reach-by-reach description).

The chapters "Alternatives", "Affected Environment" and "Environmental Effects" are consistently inadequate in addressing site specific issues. The "Affected Environment" descriptions virtually ignore the necessary background information for the analysis in "Environmental Effects." The "Alternatives" chapter which should provide enough information so that reviewers may evaluate each site's comparative merits supplements the "Affected Environment" Chapter by providing a cursory one-line description of each disposal site, yet fails to disclose how the site will be operated and maintained.

The "Environmental Effects" chapter is left unsupported by "Alternatives" or "Affected Environment" and precedes with bald conclusions derived by no obvious logical thought process.

Obviously, these three chapters should be brought up to acceptable standards by providing relevant site descriptions, operational descriptions and factual impact evaluations.

32. We believe that the Affected Environment section is appropriate to allow the reader to understand the effects of the GREAT I proposals. Substantial portions of the GREAT I main report and work group appendices are incorporated by reference to guide the reader to sources of additional information. CEQ regulations emphasize the need to reduce paperwork (40 CFR 1500.4). We believe that the reader has a responsibility to investigate such other sources if he desires additional information. The information in the GREAT I report cannot be feasibly reproduced in the EIS if the document is to remain readable and usable.

33. No response necessary.

34. The channel maintenance operation description appears on pages 59-61 of the final EIS. References to sources of additional information on this subject are included there. The information requested in (d) is beyond the current state-of-the-art knowledge of the river's hydrology.

35. More detailed descriptions of the disposal sites are included in the final EIS. GREAT I has developed information on how the selected sites would be used and maintained but not for the other alternative sites. This information is contained in the Channel Maintenance Plan.

36. We trust that this is an overstatement of your concerns. We have added additional information in the final EIS to facilitate review while attempting to avoid excessive bulk in the text. We have added information on the level of data available and on the additional environmental documentation necessary to fully implement all the GREAT I recommendations.



37. The "Environmental Effects" chapter should address combined impacts of the recommendations, the reversibility of the effects of proposed actions, and the depletion of energy and other resources.

38. The Draft EIS vaguely refers to tying as a justification for its lack of factual information. However, CEG 1508.28 is quite clear in identifying site-specific analysis as the last or lower step in tying. Since the dredge spoil disposal plan is site specific, most of the indicated tying is inappropriate. All relevant information should be presented to produce an adequate EIS.

39. The complexity and spatial scope of the various recommendations indicate the need for both topical and geographical indexes. Indexes could help local and special interest groups quickly locate the information important to them and thereby provide more effective public involvement.

40. The Draft EIS refers to Channel Maintenance Plan, Recommendations, River Resource Management Recommendations, and Recreation Site-Specific Recommendations, yet the title of the Draft EIS only refers to the second group of recommendations the "River Resource Management Plan". As noted on page 13, this title reflects an original intent of GREAT I, but the time and funding constraints have produced something less. We now have only a dredge spoil disposal plan and a haphazard collection of channel maintenance and resource management recommendations. The title should be changed to represent the GREAT I final product, not the optimistic intent.

41. Page 1 - Responsible Agencies and States - The State of Wisconsin was a member of the GREAT Team but in no way was responsible for the development of this Environmental Impact Statement.

42. Pages 6-10, Summary - This summary lacks a definition of exactly what action this Draft EIS addresses. Furthermore, the summary does not include a summary of impacts, nor a summary of proposed recommendations, nor a summary of selected choices from the alternatives.

43. Page 6, Major Conclusions and Findings - This section is grossly imbalanced. The 158 Resource Management Recommendations deserve more weight than one sentence in paragraph b. Note that the Channel Maintenance plan is addressed in paragraphs c, d, e, f, g, h, and i in this section, while the Resource Management Recommendations are only given one sentence. This imbalance should be corrected.

44. Page 7, Last Paragraph - This paragraph refers to trade-offs made in the Channel Maintenance Plan. Somewhere in the main report, EIS or Appendices the trade-offs should be identified and explained.

37. The combined impacts of the recommendations are discussed at the end of the individual impact discussions for the various groupings of recommendations along with the reversibility of the impacts. Insufficient data is available to project energy resource impacts. These impacts will have to be addressed in supplementary documents when more specific project information is available.

38. We believe that the GREAT I EIS correctly uses the tying concept. Even though the Dredged Material Placement Plan is site-specific in identifying areas for dredged material placement, additional environmental documents will need to be prepared for the use of these by dredging job. For more information, see page 12 and Section 6 of the final EIS.

39. An index has been added to the final EIS.

40. The titles of the final EIS and the GREAT I main report have been changed.

41. The listing has been clarified to note the "Member" agencies. Also, the foreword and List of Preparers should clarify that the State of Wisconsin did not participate in the preparation of the EIS. Although the State did not participate in the preparation of the EIS, it still shares responsibility, as a GREAT I team member, for the impacts of the GREAT I recommended actions.

42. The Summary of the final EIS contains a summary of impacts by reference (as did the draft EIS Summary) to minimize reproducing tables as much as possible. The Summary stresses the major issues, problems, and controversy as specified in 40 CFR 1502.12. The nature and number of the GREAT I recommendations does not allow summarization of all the recommendations.

43. The Summary in the final EIS provides a more expanded discussion of the recommendations.

44. The tradeoffs are evident in the tables that summarize the impacts of the alternative channel maintenance plans (Tables 1 and 2 in the final EIS).

Page 8, First Paragraph - The EIS should indicate why these five problems are the most significant. Present the criteria or features that make these five problems stand out from the rest of the problems.

Page 8, Paragraphs e and f - These two paragraphs refer to issues that haven't been resolved. Somewhere in the main report or EIS these issues should be identified and discussed.

Page 9, Paragraph g - This paragraph indicates that there was sufficient information to choose sites, yet not enough information for 404 (b) purposes. This paragraph should clarify how you can have sufficient information for one yet not enough information for the other.

Page 9, Paragraph 4 a - As discussed earlier, we contend this is an improper use of tiering.

Page 10, Paragraph b - This paragraph indicates recommendations involving physical actions will require an additional environmental assessment due to lack of information. Again, we contend this constitutes improper tiering. Site Specific Recommendations must be substantiated with enough information to justify the selection of the site and to evaluate the alternatives.

Page 11, Paragraph 1.003 - The concerns and problems are not listed in Chapter 3 of the main report. They are presented in the Plan Formulation Work Group Appendix, Exhibit B.

Page 13, Paragraphs 2.001 and 2.002 - These two paragraphs nicely clarify the difference between the intent and the results of the GREAT I study.

Page 13, Paragraph 2.004 - The various types of recommendations presented by GREAT I need better clarification than is presented here. Recommendations SE 3 and SE 21 duplicate many of the recreation site-specific recommendations. The Channel Maintenance plan also contains recommendations for specific disposal sites and other recommendations (see general remark #3). Pages 228-232 of the main report also contain recommendations.

Page 14, Paragraph 2.008 - This paragraph misrepresents the concept of alternatives. Alternatives should be functionally equivalent. This recommendation tacitly implies that the posting of park signs is an alternative to engineering the river to minimize dredging or that posting "no swimming" signs is an alternative to contract dredging. This is preposterous and an insult to the reader. Furthermore, this misrepresentation strikes directly at what CEQ refers to in 1502.04 as the "heart of the environmental program." Functional alternatives and the "no action" alternative should be provided for each recommendation.

45. The Summary of the final EIS expands the discussion of major issues, problems, etc. However, to explain fully why these are the most important issues would require considerable expansion of the discussion and would defeat the purpose of a "Summary." We believe that the readers have some obligation to review the main report and appendices if they are interested in further information.

46. These issues have been resolved and the major ones are identified in the Summary of the final EIS. The remainder are covered in the recommendations.

47. To briefly summarize, 404(b) evaluations are generally dredging job-specific. Information such as sediment type and quality, volume of material dredged, equipment to be used, and exact disposal area are needed to complete the 404(b) evaluation. This type of information is usually only available at the time of dredging. Therefore, 404(b) evaluations cannot be prepared at this time for 40-year disposal sites.

48. See response to comment 65.

49. See response to comment 65 and Section 6 of the final EIS.

50. This reference has been deleted.

51. No response necessary.

52. The GREAT I recommendations have been reformulated and reorganized. They appear in the final EIS on pages 20-41.

53. The intent of paragraph 2.008 of the draft EIS was to state that the only alternative for each recommendation is the no action alternative. This discussion of alternatives for the recommendations has been rewritten and appears in paragraph 2.015, page 20.

Page 28, Paragraph 2.004 - The CMA contains very little additional information on these factors. The criteria for the five alternatives 54. plans should be clearly represented in the EIS.

Page 43, Paragraph 2.016 - Outlining the compromises and steps in developing this plan is not enough. The EIS should sharply define the 55. issues and provide a clear basis for the choice between the options. (CEQ 1502.14)

Page 51, Paragraph 2.004 - Refer to my page 14, paragraph 2.008 remarks. Also, the difficulty of the task does not preclude the need to satisfy 56. the intent of NEPA and requirements of CEQ.

Page 51, Paragraph 2.005 - The artificial classifications of CM, SE and 57. are often misleading to the reader. To aid the reader and decision-makers, the recommendations should be arranged by purpose or objective such as minimize sedimentation/erosion, minimize dredging, environmentally responsible spoil disposal, mitigation and others.

Page 51, Paragraph 2.006 - The Recreation Work Group recommendations 58. should have their status clarified. They are not presented in the main report except in SE 3 and SE 21, so what is their value? Other work group recommendations were eliminated by the Plan Formulation Work Group. Were the Recreation Work Group recommendations also eliminated by the Plan Formulation Work Group?

Page 52, Paragraph 2.007 - The impacts of the recommendations should be 59. grouped and summarized to show secondary impacts and to provide a total picture of this proposed action.

Page 55, Paragraph 3.007 - As discussed earlier, this section should be 60. expanded to show the problems resulting from the change in the resource and to clarify the reasons behind the conflicting use issue.

Page 63, Paragraph 3.042 - Since waterway transportation depends on 61. publicly-funded locks, dams and maintained channel, this system hardly depends on a free-enterprise system. This paragraph should include the cost of constructing and maintaining the 9-foot channel.

Page 63, Paragraph 3.043 - This paragraph should be expanded to vividly 62. describe each step in the dredging/disposal operations.

Page 63, Paragraph 3.044 - The statement that the river is physically 63. capable of transportation expansion is misleading. Neither engineering nor environmental concerns were evaluated by the cited reference, the Commercial Transportation Work Group Appendix.

Page 68, Environmental Effects - The use of dredge spoil materials for 64. beneficial use should be discussed both on a site-specific basis and in terms of the entire watershed.

54. The criteria are described in further detail on pages 13-14 of the final EIS.

55. We believe the EIS defines the issues and presents the impacts of the alternative disposal sites to the extent that is possible, based on existing data and the broad-based nature of the GREAT I study. The reasons for the site selections are documented in the Channel Maintenance Plan (CMP) and summarized in the EIS with a reference to their location in the CMP.

56. See response to comment 53.

57. The recommendations have been reorganized to make them more understandable.

58. The Recreation Work Group recommendations to which you refer were not given official recommendation status. They are included in the rationale for recommendations Action Item 19 and Further Study Item 41. Their status is that of areas for priority consideration in maintaining primitive recreation sites and for future recreational facility development.

59. The combined impacts of the recommendations are addressed following each functional group (Section 4 of the final EIS).

60. See response to comment 32.

61. This statement has been deleted in the final EIS.

62. A description of dredging and disposal operations is included in the final EIS (pages 59-61).

63. This statement has been revised to clarify its meaning and intent.

64. For each disposal site, it is noted whether material placed at that site would be removed for beneficial use. This appears in the impact section, pages 92-153. The Dredged Material Uses Work Group Appendix is referenced for a comprehensive discussion on identified beneficial uses (page 92).

Page 69, Paragraph 4.002 - Once again, we contend the concept of tiering is used inappropriately here. This paragraph indicates that the subsequent assessments will not deal with alternative sites. Specific site information must be evaluated before a site is selected. Selecting sites without adequate information violates the intent of NEPA by foreclosing future options.

Page 69, Paragraph 4.004 - The maps referenced in the Channel Maintenance Appendix are inadequate by themselves. The dots representing each site on each map do not adequately portray the shape and size of the proposed dredge spoil site. Site plans of a representative scale which show the site outline are needed. Vegetation, topography or sloughs should not be obscured by the site outline.

Page 71, Paragraph 4.009 - This paragraph says on one hand that water quality standards will be met, but on the other hand it is difficult if not impossible to meet water quality standards at every site. This self-conflicting paragraph needs clarification. Furthermore, water quality standards violations should be addressed on a site-specific basis.

Page 77, Paragraph 4.036 - This paragraph indicates dredging will continue under all of the alternative channel maintenance plans. This highlights a major shortcoming of the alternative channel maintenance plans i.e. true channel maintenance alternatives are really not presented. At least two additional Channel Maintenance Plan alternatives should be addressed in the Environmental Impact Statement. One additional alternative would be that of no dredging whatsoever. Under this alternative the EIS should evaluate the normal stabilized depth of the river on a reach-by-reach basis, and the potential for grounding or channel closure. Another alternative Channel Maintenance plan would be to consider structurally manipulating the river to maintain the 9-foot Channel without dredging or with minimal dredging.

Pages 78-129, Site-Specific Proposals - This discussion should be descriptive, not judgemental. The impacts of open water transfer procedures were totally ignored. Also, these recommendations are not related to any of the other recommendations.

Page 89, Paragraph 4.127 - This paragraph indicates that several sites require more information before a site-specific assessment can be made. The paragraph contends that social information changes rapidly because of the rapid development, but does not indicate how this problem can be resolved. Since this is the site selection stage, the EIS should incorporate the best information currently available and note the reliability of the data. To provide site data after the site has been selected is rather fruitless.

65. We believe that the EIS correctly uses the tiering concept. Specific site information was evaluated in the selection of the disposal sites. However, for an ongoing activity such as channel maintenance, certain pieces of information will not be available until an actual dredging job is proposed. This information will be used then to prepare an assessment for that particular dredging job. Examples of information that would be specific to each dredging job are: (1) sediment quality; (2) volume of material to be dredged; (3) current status of the GREAT selected site in terms of ownership, capacity, and habitat; (4) new alternative sites; (5) newly identified beneficial uses; (6) rehandling sites; (7) funds available to do the job; and (8) current regulatory requirements.

Future options are not foreclosed because GREAT clearly recognizes that the Dredged Material Disposal Plan must be flexible in the future to accommodate conditions as they may exist at the time of dredging.

66. The maps and photographs that appear in the Channel Maintenance Appendix are the best available at this time. To reduce bulk and minimize reproduction costs, they have not been reproduced in the EIS.

67. This paragraph has been substantially revised to eliminate this contradiction (page 83). Potential water quality violations have been identified on a site-specific basis.

68. GREAT made the initial assumption in its studies that channel maintenance by dredging would occur. It was considered beyond the scope and capability of the GREAT study to undertake the efforts that would have been necessary to determine at what depth the river would stabilize without dredging.

69. A study to determine if structural measures could be used to maintain the channel was considered beyond the scope and capabilities of GREAT.

70. The impacts of disposal sites are described to the level of detail that current information allows and in a format that facilitates comparison of sites. Open water transfer impacts are not discussed because, for most disposal sites, rehandling sites have not been identified. GREAT believes that this is one of the items that must be addressed at the time of dredging on a job-by-job basis through the on-site inspection procedure and State permit process.

71. Current social conditions and potential impacts are among those factors that will have to be addressed at the time of dredging and will be considered in the decision-making process at that time. See responses to comments 38 and 65.

Page 130, River Resource Management Recommendations - This section should include the no-action alternative, i.e., the most probable future without GREAT. The "no-action" alternative discussion should include both long-range and short-range forecasts of the river habitat without implementing any of the GREAT I recommendations. This section is presented in the same illogical format as the main report. There is no cross-referencing to related recommendations, secondary impacts are not addressed, costs are not considered, functional alternatives are not presented, evaluations are judgmental (not descriptive), and there is no relationship developed between these recommendations and the current master planning and GREAT II programs.

72.

Page 130, Paragraph 4.423 - Once again, we contend the tiering concept is being misused. Tiering may be appropriate for the more general recommendations; however, detailed site information is needed for the site-specific recommendations. Detailed site information is virtually useless once a site has been selected.

73.

Page 146, Paragraph 4.549 - This paragraph should address the Statewide implication of a massive effort in only one area. Recommendation NR 10 provides for \$243 million initially and \$44 million annually to operate and maintain erosion control practices. Current Statewide allocations for upland erosion control practices are only a small fraction of this proposed expenditure. Such a massive effort in one area may jeopardize other areas. The Soil Conservation Service and the local Soil and Water Conservation Districts may have to reallocate their manpower resources at the expense of other regions to implement such a program. The resulting reduction in Statewide erosion control practices could have significant impacts on both water quality and agricultural soils throughout the rest of the State. Also, the annual acreage of potential cooperators should be evaluated to verify the annual demand for this voluntary program.

74.

Page 166, Recreation Site-Specific Recommendations - These recommendations do not appear in the main report. What is their status? Have they been approved by the plan formulation work group? How do these recommendations differ from Recommendations SE 3 and SE 21?

75.

While the Draft Environmental Impact Statement is a much more readable document than the main report, it has so many organizational and content problems that it fails to provide a full and fair discussion of significant environmental issues. Furthermore, with the apparent lack of significant site-specific information, it appears that the GREAT process has failed to inform decision-makers of the environmental consequences of the proposed actions. Therefore, neither the process nor the EIS document appear to have complied with the purpose and intent of NEPA. We therefore

76.

72. The impacts of the recommendations and the no action alternative are discussed on pages 153-205 of this EIS. Recommendations are grouped by topic as much as possible with combined impacts discussed. The discussion of impacts is as descriptive as possible considering the general nature of many of the recommendations. No relationship is developed with the Upper Mississippi River Basin Commission (UMRBC) master plan because that effort is just entering the study stage and has not yet produced anything for comparison. Because the GREAT I and GREAT II study areas are separate and because the GREAT I recommendations are for the GREAT I area, we do not believe it is necessary to develop a relationship between those two studies in this document. This would be more appropriately accomplished in the UMRBC master plan.

73. See responses to comments 38 and 65.

74. The type of information requested in your comment will have to be developed by the Soil Conservation Service and the States, if and when they implement recommendation NR 10 (now numbered as Action Item 12). Developing this information is beyond the capabilities of GREAT.

75. See response to comment 58.

76. We believe that the GREAT EIS does meet the purpose and intent of NEPA. The environmental impacts of the various GREAT proposals are documented to the level possible based on current information.

G. Paleuh

April 1, 1980

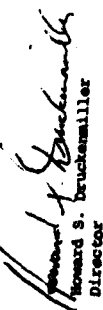
Page 8

urge you to re-draft and re-issue this Draft Environmental Impact Statement after all the relevant information and data have been collected and incorporated into the Environmental Impact Statement.

77. We have not reissued the EIS as a draft. Instead, we have prepared a final EIS which we believe contains all of the relevant information available at this time.

Sincerely,

Bureau of Environmental Impact

  
Howard S. Bruckemiller  
Director

cc: John Wolfen - Fish and Wildlife Service  
Wayne Knott - Corps of Engineers



# MINNESOTA-WISCONSIN BOUNDARY AREA COMMISSION

610 SECOND STREET, HUDSON, WISCONSIN 54016

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Wisconsin Wildlife  
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78. The EIS has been bound separately from the main report.

March 31, 1980

Messrs. Wayne Knott and John Wolfin, Co-chairmen  
Great River Environmental Action Team (GREAT I)  
U. S. Army Corps of Engineers, St. Paul District  
U. S. Post Office and Customs House  
Saint Paul, Minnesota 55101

Gentlemen:

The Minnesota-Wisconsin Boundary Area Commission is pleased to provide the following comments on the GREAT I Draft Report and Appendices as part of the process of proposing responsible actions to the Congress, State governments and other authorities for improved management of the Upper Mississippi River and navigable tributaries. You will note that most of the comments relate to the Commission's views on how best to present the recommendations so they will, indeed, get the attention they deserve and be acted upon. The Commission recognizes that there will be an abundance of technical comments which, it assumes, will address the "nuts and bolts" issues and so we will not add substantially to that commentary. Instead, our comments will center on those areas which we are best suited to respond to through our unique position under the Interstate Compact. Nevertheless, because of our coordination responsibilities for administration of the Lower St. Croix National Scenic Riverway, you will find some specific comments regarding channel maintenance and recreational management on the St. Croix River.

## GENERAL COMMENTS

1. Report Format - The Commission recommends the following actions with respect to the format of the Final Main Report:

\*Separate the EIS from the Main Report to provide for a more concise-looking Main Report and for easier cross-referencing between the Main Report recommendations and the associated environmental impacts.

78.

\*Use different colored paper for each main section of the Main Report to make it more "alive-looking" and easier to follow and reference between sections.

\*In final editing, please take care not to use abbreviations or acronyms so freely; in many instances they need to be spelled out. There ought to be a glossary of terms in the report and terms should be standardized throughout, e. g., "dredged spoil vs. dredged material." Many persons studying the final report will only look in a few sections to find statements on matters of particular interest to them, so they won't necessarily have caught on to abbreviations or acronyms if they only appear in their full expression once or twice in the early pages of the text.

\*References need improvement: tables of information not original with the report need source citations; publications referenced in texts need identification; in some documents, authors are listed without identifying their expertise or affiliation.

March 25, 1980

22. Recommendation SE-3 on page 195 promotes using dredged material to maintain four existing primitive beaches in Pool 3. We support this recommendation, and urge that other sites for new primitive beaches be identified.
23. Recommendation SE-21 on page 205 proposes several recreational facility improvements in Pool 3. We support the proposals to create: a lockage waiting/beach area just below Dam 2 at Mile 814.9L; a lockage waiting/beach area just above Dam 3 at Mile 797.4L; recreation facilities at Commissary Point just above Dam 3 at Mile 797.3R, and, incidentally, a proposal for multipurpose trails on the Wisconsin bluffs. The final GREAT I report should not support expansion of Hub's Bait, King's Cove, and Hastings Marina, and the proposed new boat access at Mile 808.5L should not be created unless it is carry-in only. That boat access site is only a short distance from Prescott by good road, making it too accessible to the Twin Cities area. Such a ramp here, as is the case with the existing ramp in Prescott, would be of primary benefit to boaters from Minnesota, not to the Wisconsin residents who would pay for its construction. If the ramp were carry-in only it would benefit hunters and fishermen and would not be used by the large numbers of power boaters that currently clog the Prescott Ramp.
79. The GREAT I team has dropped this particular project from its list of recommended further studies (see Further Study Item 41).
80. No response necessary.
81. See response to comment 79.
82. No response necessary.
83. These factors will have to be taken into consideration at the time when feasibility studies and impact evaluations are conducted on specific recreational developments.

24. Several of the site-specific recreation recommendations for Pool 3 on pages 172-178 of the Draft EIS deserve comment. Recommendation 6 on page 172, that the Prescott Ramp should be expanded, should not be accepted. It has been determined that most of the boats launching at that ramp spend their recreation days on the Lower St. Croix, compounding crowding problems there. Expansion of the ramp and/or parking lot would only add to those problems. Recommendations 3, 4 and 5 on page 174 all involve expansion of launching ramps. But because these ramps are less accessible to Twin Cities residents, are primarily used by fishermen and hunters and are in the lower end of Pool 3 where impact on the St. Croix is minimal, we do not object to them. Recommendation 11 on page 174, that the city of Prescott should consider a marina behind Prescott Island, should not be accepted. New marinas should not be allowed in this area of heavy St. Croix impact. We also question the feasibility of a Wisconsin municipality creating a marina located in Minnesota accessible only by passing through a privately operated barge fleet area. Paragraph 4.728 on page 175 acknowledges the potential adverse impact on the St. Croix of some of the proposed study items, and recommends that impact be given close consideration during the conduct of project feasibility studies. We strongly support that, and offer to cooperate in every way possible during those studies.
25. Any recreational facility development in Pool 3 must be considered in light of the presence at the lower end of the pool of the Prairie Island Nuclear Generating Plant. It would be difficult, if not impossible, to quickly warn boaters in lower Pool 3 in the event of a nuclear accident at Prairie Island. Maintenance of existing dredged material recreation sites and the proposed creation of new ones would attract boaters to beach and recreate in what could be a dangerous area. Two steps can and should be taken to help reduce the danger. Public use areas along the river within five miles of the nuclear plant---whether they be natural sandbars or sand areas created by dredged material placement---should be posted with signs alerting boaters to the potential dangers they may face if they are not able to learn of an accident quickly and recommending they keep their marine radios tuned to the channel on which Lock and Dam 3 operates.
80. No response necessary.
81. See response to comment 79.
82. No response necessary.
83. These factors will have to be taken into consideration at the time when feasibility studies and impact evaluations are conducted on specific recreational developments.



March 25, 1990

Corps employees at Lock and Dam 3 should be connected to the nuclear emergency radio network being assembled for Prairie Island residents as a result of the October 1979 accident at the plant. Corps employees would then be informed immediately by NSP employees if an accident occurred, and they in turn could broadcast a warning to boaters in the area. The use of warning sirens should also be considered.

26. Recommendation 1 at the top of page 177 is not opposed. The Vermillion River Public Accesses are in backwater areas and are used primarily by fishermen and hunters, and do not contribute large numbers of power boats that would add to St. Croix congestion.

27. Two errors appear on page 74 of the Draft EIS. One is in paragraph 4.020, where the lower segment of the Lower St. Croix is described as shallow, enclosed, narrow, etc. That is a description of the upper segment of the Lower St. Croix, not the lake-like lower segment.

28. The next paragraph (4.021) discusses the national designation of the Lower St. Croix, and incorrectly implies that the two states administer the Riverway only through the Minnesota-Wisconsin Boundary Area Commission. While the MNBAC does play a coordinative role, it is not directly involved in administration of the Riverway. The error can best be corrected by ending the paragraph with a period after the word "Wisconsin" in the second-to-the-last line.

29. Paragraph 4.023 on the same page correctly discusses the profound recreational impact potential of dredged material placement. Such recreational impacts should be watched closely.

30. The St. Croix site-specific disposal impacts discussion on pages 87-89 of the Draft EIS contains several apparent errors that should be corrected.

88. A. In paragraph 4.107 on page 87 is a reference to SC.01, but the discussion clearly is not about that island site. It appears that should be changed to SC.07.

89. B. A similar error appears to have been made in 4.114 on page 88, where there is a reference to SC.21. That is now a swimming beach, but the discussion calls it a marina site. It appears the discussion is actually about SC.25, the Bayport Marina location.

90. C. In the next paragraph, 4.115, there is a discussion of site SC.23. That site is not located on any of the maps provided to us with the reports, and there is no clue in the paragraph (nor in a reference to SC.23 on page 16 of the Draft EIS) to the probable location of that site.

91. D. Similarly, the maps do not tell us the location of SC.09, discussed in 4.123 at the top of page 89. There is also a statement in that paragraph that site SC.22 is not accessible to recreation and would provide no recreation benefits. That is incorrect. Site SC.22 is publicly owned property in the city of Hudson that is proposed for development as a public swimming beach.

84. No response necessary.

85. This error has been corrected.

86. The paragraph has been corrected as suggested.

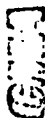
87. We concur.

88. The error has been corrected. See page 106 of the FEIS for a discussion of impacts at sites SC.01 and SC.07.

89. The error has been corrected. See page 104 of the FEIS for a discussion of impacts at SC.21. Site SC.25 is not discussed as it was eliminated from consideration early in the site selection process.

90. SC.23 was not one of the sites considered in the final selection of disposal sites for the St. Croix River, so it is not addressed in the FEIS. SC.23 was an open water site in the lower end of Lake St. Croix similar to SC.16.

91. SC.08 is an industrial site in Hudson, Wisconsin. Since it was not one of the final alternatives considered in selecting sites for the Hudson dredge cut, a discussion of the impacts of its use is not included in the FEIS. The description of SC.22 has been corrected (see page 64 of the FEIS).



COUNCIL FOR MINNESOTA ARCHAEOLOGY  
OFFICE OF THE STATE ARCHAEOLOGIST  
UNIVERSITY OF MINNESOTA  
ST. PAUL, MINNESOTA 55101

January 24, 1980

Mr. Wayne Knott  
St. Paul District, Army Corps of Engineers  
1135 U. S. Post Office and Custom House  
St. Paul, Minnesota 55101

Mr. John Wolfen  
U. S. Fish and Wildlife Service  
Twin Cities Area Office  
530 Federal Building and Court House  
316 North Robert Street  
St. Paul, Minnesota 55101

Dear Sirs:

This letter contains my comments on the draft of the  
CEQA I win report, draft Environmental Impact Statement,  
and draft appendices.

A literature search regarding archeological and historic  
research of the complete project area will assist in  
planning for the location and protection of the cultural  
resources. I concur with statement 3.0.7 on page 6  
of the Draft Environmental Impact Statement that states  
that such a survey should be carried out.

Although not always specifically stated in the report or  
its appendices, all areas to be impacted by proposed  
projects should be examined to determine whether cultural  
resources will be affected by the project's inception.  
I concur with statement on this matter in the following  
reports: conclusion 16 on page 13 of the Recreation  
Work Group Appendix, recommendations 19, 17 and 27 on  
pages 208 and 210 of the Main Report Draft, and state-  
ments 3.0.9-3.0.12 of the Draft Environmental Impact  
Statement.

The responsibility for such a survey is assigned to the  
Corps of Engineers in the land survey, and the Fish and  
Wildlife Service as the cooperating agency (as stated on  
pages 277, 224, and 2-5 of the main report). I urge these  
agencies to contact this office as they develop plans to  
carry out such a survey.

- 92. No response necessary.
- 93. No response necessary.
- 94. No response necessary.

95. No response necessary.

Knott, Wolfen  
GRI's draft  
Page 2

95. Finally, I concur with Laurie Lucking's recommendations regarding site-specific disposal areas, impact on cultural resources, and impacts of proposed GREAT recommendations on cultural resources, as stated in pages 78-210 of the Draft Environmental Impact Statement. Such recommendations should be used as guidelines for further planning in these areas.

GREAT represents a cooperative effort on the part of many agencies involved with the preservation and maintenance of the Mississippi River and its resources. It is important that such a project be correctly directed in its initial stages to ensure that the interests of all parties are equally and properly addressed.

I appreciate the opportunity to comment on this draft report. If I can be of further assistance, do not hesitate to contact me.

Sincerely,



Christy A. H. Caine  
State Archaeologist

SE 7, SE 8, SE 9: We concur in these good recommendations.

SE 15: This would appear to be another "gag the states" suggestion, similar to CM 54. We are opposed to it.

SE 16: While there may be certain regulatory inefficiencies that should be corrected, in general we believe that the regulations and procedures that have been adopted are vital to the protection of the general public interest along the river. We would oppose any broad-sided "fast track" approach designed to please the commercial waterway interests.

SE 22: It is not at all clear what this is getting at, unless it is an attempt to fabricate other beneficiaries of the 9-foot navigation project in order to reallocate present and future resources. We repeat that such attempts are spurious: the project was designed and is maintained solely for the purpose of commercial navigation. Recreational use of the river existed prior to initiation of the navigation project and this class of uses should not be saddled with navigation project costs.

SE 30: As with CM 54 and SE 15, this appears an unwarranted attempt to reduce the rights of the states to protect their own resources and citizens.

SE 34: Clearly any recommendation to expand navigation capacity, including expansion at locks and dams 2 and 3, must await the findings of the Upper Mississippi River System Comprehensive Master Plan. We urge that this recommendation be struck.

#### IV. GENERAL COMMENTS ON THE ENVIRONMENTAL IMPACT STATEMENT

This is not in fact an environmental impact statement on a "river resource management plan" in that the Main Report Draft itself fails to constitute such a plan. Nor is it an EIS on the channel maintenance plan, in that it does not begin to present enough detail site by site. It is not a programmatic impact statement, as there is no program.

While there is some good material in the EIS, its purpose is obscure, due largely to the confusing and diffuse nature of the main report itself.

We found the segments on alternatives somewhat useful, but defective on a couple of counts. First, there should be more detailed discussion of the factors that went into the alternative site definitions, particularly the EQ and NED criteria, pages 6-7. Second, there is no basis given as to why one site was chosen over another at any specific dredge cut. Only by presenting that reasoning process can the EIS help a decision maker or the public decide whether an intelligent choice was made.

96. Paragraphs 1.005-1.008 (page 12) and Section 6 of the final EIS discuss this subject. "Programmatic" was a poor term to use in describing the GREAT I study.

97. The purpose of the GREAT I EIS is to present the impacts of the GREAT I proposals to the level of detail that the impacts are known. We recognize that additional environmental documents need to be prepared when specific projects are actually proposed for implementation.

98. Additional information on these criteria has been added to the FEIS (see pages 13-14).

99. The basis for site selection is summarized by pool in the FEIS. Additional information on the decision-making process is referenced in the Channel Maintenance Appendix.

# MALEACOLOGICAL CONSULTANTS

Nand Mullusk Surveys  
Marian F. Haskin  
1603 Mississippi Street  
La Crosse, Wisconsin 54601

608/782 7958  
30 January 1980

John Wolfelin  
USFWS  
530 Federal Bldg. & Court House  
316 N. Robert St.  
St. Paul, Minnesota 55101

Re: GREAT Draft Reports, comments. These reports have been looked at from a fish and wildlife point of view, with an emphasis on Pools 7, 8, and 10 and the St. Croix R.

## Main Report Draft

I liked the preface--if indeed the Mississippi R. is an overworked resource (I agree), then how can we possibly think of greatly increasing the impacts upon it, especially commercial navigation? This is quite a different statement than in is the Commercial transportation report (#2 and 3)

The format of explaining the pools is good, however please include a statement about live endangered species (Higgins' Eye clam) for Pools 8, 9, and the St. Croix since it is mentioned for Pool 10 (Higgins' Eye is also found in other areas of Pool 10 besides in the East Channel).

P.80, NR 18, "Chipmunk" (sp.), also p. 82, par. 3, line 5, "separate"; other spelling errors throughout also. P. 151 and p. 159, Could St. Croix and Pool 5A have enhancement projects be shown on maps? It took a considerable amount of looking to finally find the a description of the St. Croix project (at the end of this report, apparently the only place it was described).

After P. 164, please change location of bridge at Prairie du Chien (old bridge location is shown).

## EIS

Why is disposal site 10.09 described as "disturbed" upland area on p. 21, and on p. 35, 42, and 50 it is described as an "undisturbed" area. Area has been disturbed. P. 126, site has been subject to considerable wind erosion since 1976, however the area is becoming more vegetated naturally. Also there is no mention of the problems with End. species at this site, yet in Channel Maintenance rept. the site is mentioned as a disposal area for the McGregor dredge area and the problem with the mentioned for that dredge cut only. In regard to this disposal site, I suggest that if it is necessary to put spoils here that the spoils be placed immediately north of the 1976 disposal site because of the ongoing research I am doing on the 1975 disposal site. (Area serves as an ideal area for aging dead shells.) Please do not add spoils on top of the 1975 site. Some of the adjacent area is open and the rest will be empty of houses soon.

100. The description of Site 10.09 has been corrected. See page 77 of the FEIS.
101. The potential impacts of using this site on endangered mussels are identified on page 150 of the FEIS.
102. Site 10.09 was not selected as a recommended disposal site by GREAT I because of the loss of scientific knowledge that would come from covering this site, in addition to other factors.

103. P. 197A Pleased to that potential for impact on Higgins' Eye Clam is mentioned as needed (Recreational Site specific recommendations) but found this fact inconsistent mentioned throughout the report; often the fact was only mentioned once, and then not repeated in another important section leading one not familiar with the area to a false conclusion as to the fish and wildlife status of a specific area.  
 P. 207 and 208 (4.940). Proceed with extreme caution in the East Channel at Prairie du Chien. Isn't some other area of Pool 10 suitable for recreation.

Fish and Wildlife Work Group Report  
 P. 261 should also list Potamilius canax (Fat Pocketbook) as a Red. End Species (is listed in FIS on p. 56).  
 Delete Havlik 1977 reference (Isle La Plume). Other changes re muskels were sent to Mike Vanderford.  
 P. 181 Add to par. 2, statement on importance of blue gill (as a sport fish).  
 P. 202, par 2. Meaning not clear re bluegill and crappie, rearrange sentence, especially "and show no distinct trends".  
 P. 214, disturbed a bed containing a number (many more disturbed than several).  
 P. 245, who is doing the reintroduction of Peregrine Falcon?  
 It's obvious a lot of work has gone into this report.

Dredge Material Uses Work Group: no comments.

Public Participation IMG

Re-do SCWG section and delete mention of that group where possible since work group no longer exists (explain situation).  
 I agree with what happened to the process of arriving at recommendations, I often felt as though I didn't know what was happening even though I attended monthly meetings of the PMWG.

Water Quality

Who wrote the report? (This should be mentioned for all reports).

P. 23 Naiad mollusks (mussels/clams) do not recover in a dredged area for up to 10 years (see Yokely, 1976 Bull. Am. Malacolog. Un.). Par. 3, sent. 3, "relatively" short time.  
 P. 24, par. 2, sources could be better documented in text, specifically in regard to natural vegetation as an effective filter.  
 P. 26. Were polymers added to disposal material in Pool 8?  
 P. 41, par. A & C. What "important species"?  
 P. 72, are the unmanufactured shells marine or freshwater? (If from Prairie du Chien they are freshwater).  
 No. of pages are missing from several sources in the bibliography. Mauck (?) misplaced in 2 places (in Olson, Mauck) on p. 67 and 77.

103. Potential impacts upon endangered species were evaluated for every disposal site. Only if a potential impact was identified is it noted in the discussion of site impacts. The potential impact upon endangered species will have to be evaluated with each dredging job to insure continued protection of these species. The impacts of recreational developments upon endangered species will have to be evaluated when a specific development is proposed for implementation.

104. Any recreational development will have to be evaluated for endangered species impact at the time it is proposed for construction. If there would be endangered species impact, the development probably would not be implemented.

EXHIBITS

EXHIBIT 1

DRAFT EIS RECIPIENTS

Gov. Lee S. Dreyfuss, Wisconsin  
" Albert Quie, Minnesota  
" Robert D. Ray, Iowa  
Sen. Rudy Boschwitz, Minnesota  
" John Culver, Iowa  
" Dave Durenberger, Minnesota  
" Roger Jepsen, Iowa  
" Gaylord Nelson, Wisconsin  
" William Proxmire, Wisconsin  
Rep. Alvin Baldus, Wisconsin  
" Arlen Erdahl, Minnesota  
" Bill Frenzel, Minnesota  
" Martin Sabo, Minnesota  
" Thomas Tauke, Iowa  
" Bruce Vento, Minnesota  
U.S. Environmental Protection Agency  
U.S. DOA, Forest Service  
U.S. " , Soil Conservation Service  
U.S. " , State Conservationists (Minn., Wis., Iowa)  
U.S. DOC  
U.S. " , Federal Maritime Commission  
U.S. " , NOAA  
U.S. DOHEW  
U.S. DOHUD  
U.S. DOI  
U.S. " , Geological Survey  
U.S. " , Bureau of Indian Affairs  
U.S. " , Fish and Wildlife Service  
U.S. " , Heritage Conservation and Recreation Service  
U.S. " , Interagency Archaeological Services  
U.S. DOT, Federal Highway Administration  
U.S. " , Coast Guard  
U.S. DOA, Corps of Engineers  
Advisory Council on Historic Preservation  
Minnesota-Wisconsin Boundary Area Commission  
Wisconsin Dept. of Natural Resources  
" State Historic Preservation Officer  
" State Archaeologist  
" Dept. of Agriculture  
" " " Transportation  
" " " Administration  
" State Board of Soil and Water  
Mississippi Regional Planning Commission  
West Central Wisconsin Regional Planning Commission  
Southwestern Wisconsin Regional Planning Commission  
Minnesota Dept. of Natural Resources  
Minnesota Pollution Control Agency  
" Dept. of Agriculture  
" " " Economic Development  
" " " Transportation



Minnesota Energy Agency  
" Environmental Quality Council  
" Senate Natural Resources and Agriculture Committee  
" State Planning Agency  
" Dept. of Health  
" Water Resources Board  
" State Archaeologist  
" State Historic Preservation Officer

Metropolitan Council

Southeastern Regional Planning Commission

Iowa Conservation Commission

" State Historic Preservation Officer  
" Division of Environmental Quality  
" Office for Planning and Programming  
" State Planning Division  
" Natural Resources Council  
" State Archaeologist

Upper Explorerland Regional Planning Commission

Public Libraries

River Falls, Wisconsin  
Eau Claire, Wisconsin  
Platteville, Wisconsin  
Madison, Wisconsin  
La Crosse, Wisconsin  
Viroqua, Wisconsin  
Prairie du Chien, Wisconsin  
Hudson, Wisconsin  
Minneapolis, Minnesota  
St. Paul, Minnesota

University Libraries

UW-River Falls  
UW-Platteville  
UW-La Crosse  
UW-Eau Claire  
Stout State Library  
University of Wisconsin Memorial Library  
University of Wisconsin Water Resources Center  
University of Minnesota Library  
University of Minnesota Agricultural Library  
Winona State College  
St. Mary's College  
Mankato State College

Mabel Tainter Memorial Library

Minnesota Legislative Library

Environmental Conservation Library of Minnesota

Hill Reference Library

Metropolitan Council Library

EXHIBIT 2  
MAPS

# LEGEND

## RECOMMENDED CHANNEL MAINTENANCE PLAN

5 •



409 •

## ALTERNATIVE MATERIAL PLACEMENT PLANS



409 •

Alternative placement site

Site number

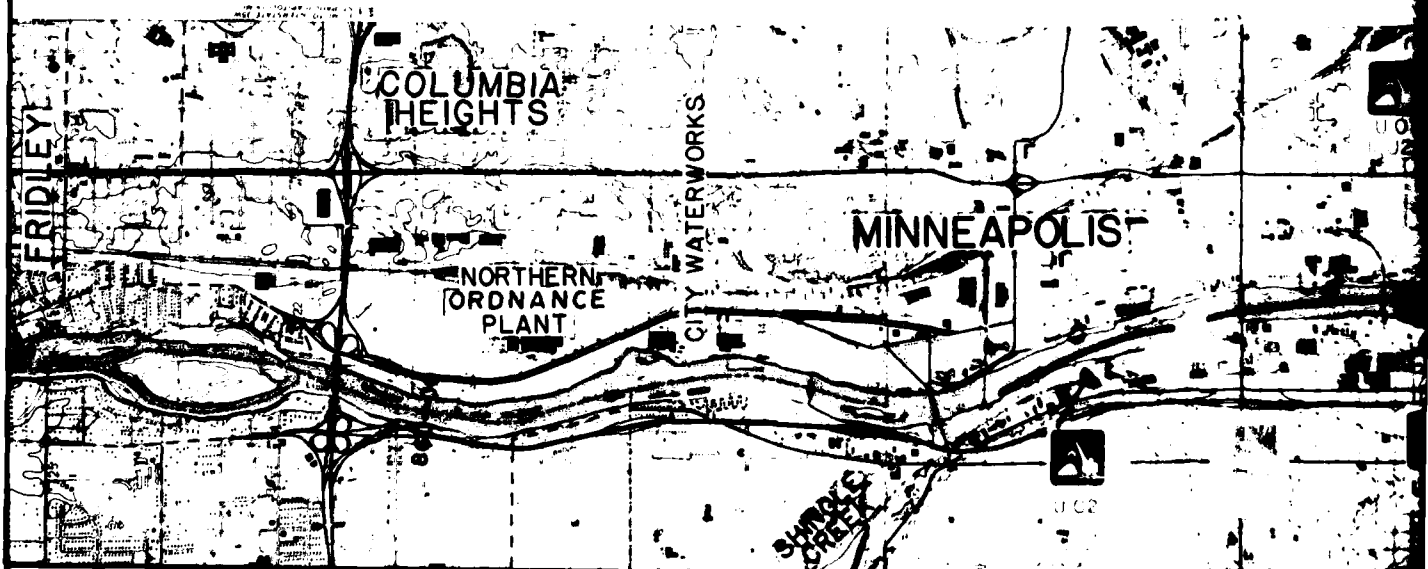
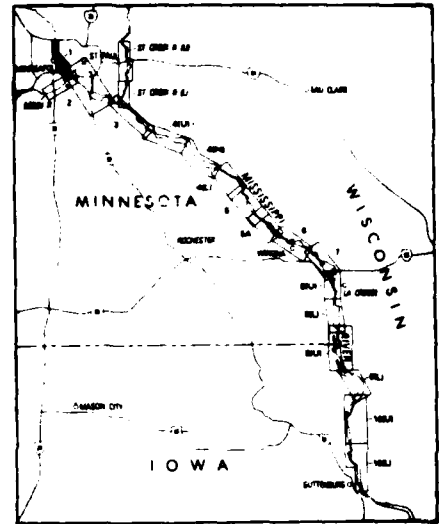
### POOL 1 & USAF

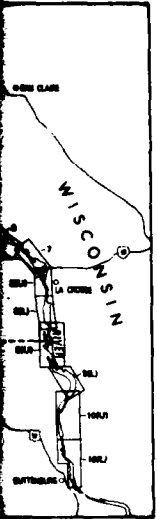
DREDGE CUT	ALTERNATIVE PLACEMENT PLANS			
	MPFW/OG	NED	EQ	RFFP
1	U.01	U.01	U.02	U.03
2	U.01	U.01	U.02	U.03
3	U.01	U.01	U.02	U.03
1	1.01	1.01	1.01	-
2	1.03	1.01	1.01	-
3	1.03	1.01	1.01	-
4	1.01	1.01	1.01	-
5	1.01	1.01	1.01	-
6	1.01	1.01	1.01	-
7	1.01	1.01	1.01	-

M = Most probable future without GREAT  
 N = National economic development  
 E = Environmental quality  
 R = Removal from floodplain

SCALE: 1" = 4,000'

CONTOUR INTERVAL 20 FEET  
 NATIONAL GEODETIC VERTICAL DATUM OF 1929





ST. PAUL

MINNEHAP

MINNEAPOLIS

S.A.F. LOWER L/D.

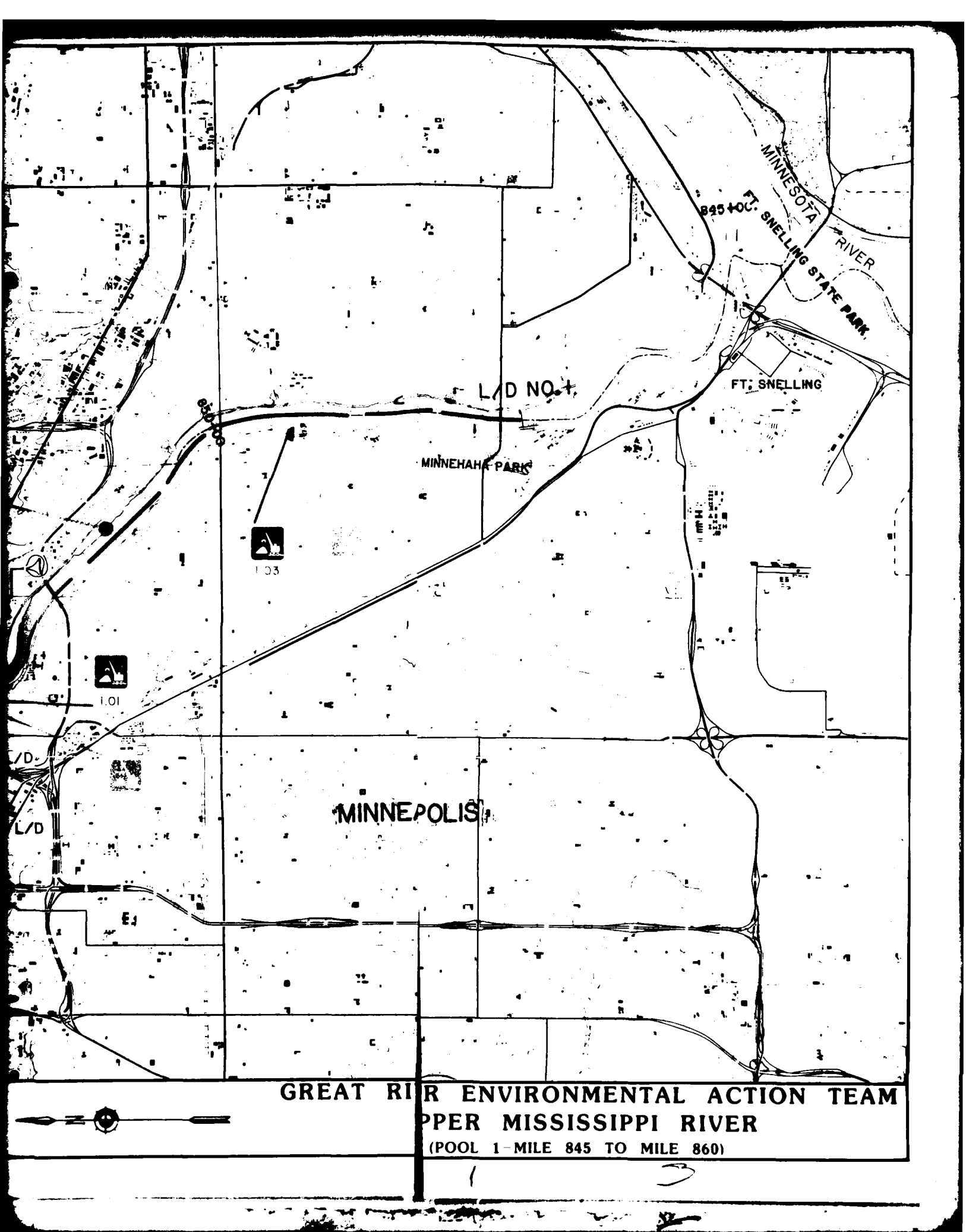
S.A.F. UPPER L/D

NICOLLET ISLAND

GREAT RIVER  
UPPER  
(POOL)



2



# LEGEND

## RECOMMENDED CHANNEL MAINTENANCE PLAN

5 -



Site number

## ALTERNATIVE MATERIAL PLACEMENT PLANS



409 -

Alternative placement site

Site number

### POOL MN

DREDGE CUT	ALTERNATIVE PLACEMENT PLANS			
	MPFW/OG	NED	EQ	RFFP
1	MN.21	MN.27	2.18/MN.27	MN.11
2	MN.25	MN.25	MN.27	MN.11
3	MN.07	MN.06	MN.30	MN.13
4	MN.03	MN.03	MN.03	MN.14
5	MN.03	MN.26	MN.03	MN.14

M = Most probable future without GREAT

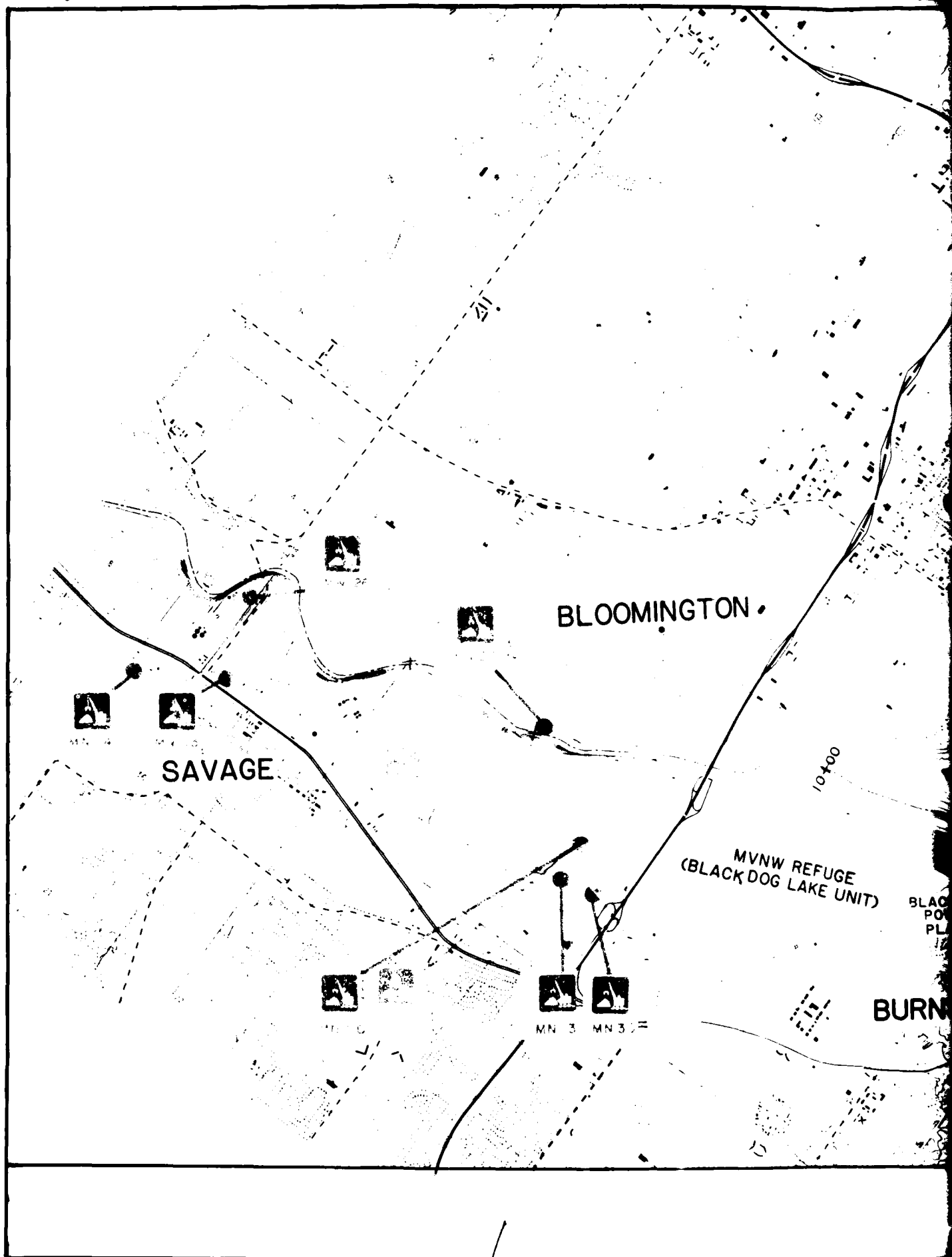
N = National economic development

E = Environmental quality

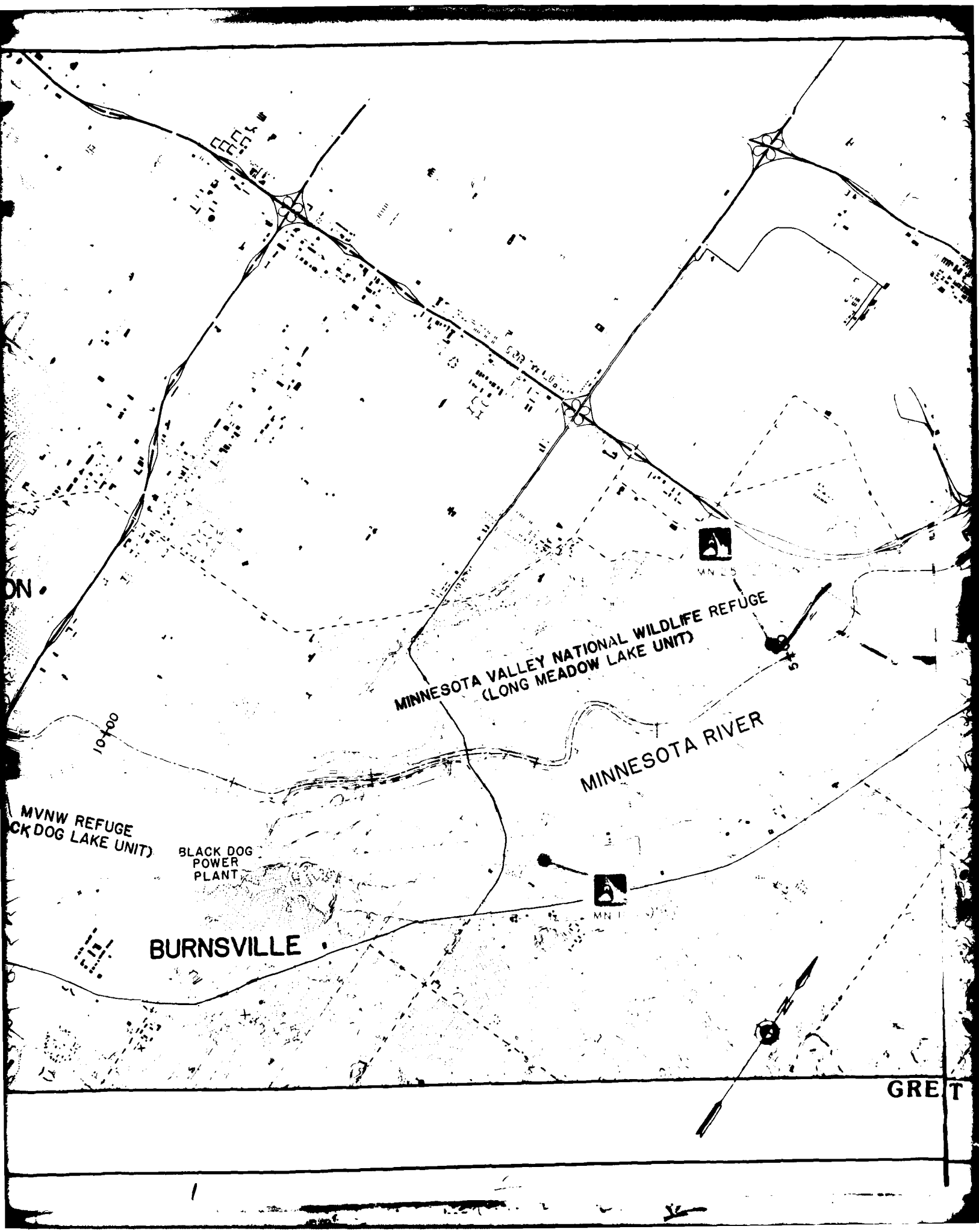
R = Removal from floodplain

SCALE: 1" = 4,000'

CONTOUR INTERVAL: 20 FEET  
NATIONAL GEODETIC VERTICAL DATUM 1929







ON

MVNW REFUGE  
BLACK DOG LAKE UNIT

BLACK DOG  
POWER  
PLANT

BURNSVILLE

MINNESOTA VALLEY NATIONAL WILDLIFE REFUGE  
(LONG MEADOW LAKE UNIT)

MINNESOTA RIVER

GRE T



# LEGEND

## ALTERNATIVE MATERIAL PLACEMENT PLANS



— Alternative placement site

409 — Site number

### POOL 2

DREDGE CUT	ALTERNATIVE PLACEMENT PLANS			
	MPFW/OG	NED	EQ	RFFP
1	2.30	2.30	2.30	2.35
2	2.31	2.35	2.35	2.35
3	2.31	2.35	2.35	2.35
4	2.24	2.24/2.25	2.10	2.10
5	2.27	2.05	2.10	2.10
6	2.04	2.05	2.10	2.10
7	2.13/2.14	2.13/2.15	2.02	2.02
8	2.16	2.16	2.16	2.10
9	2.16	2.37	2.37	2.10
10	2.29	2.18	2.18	2.18

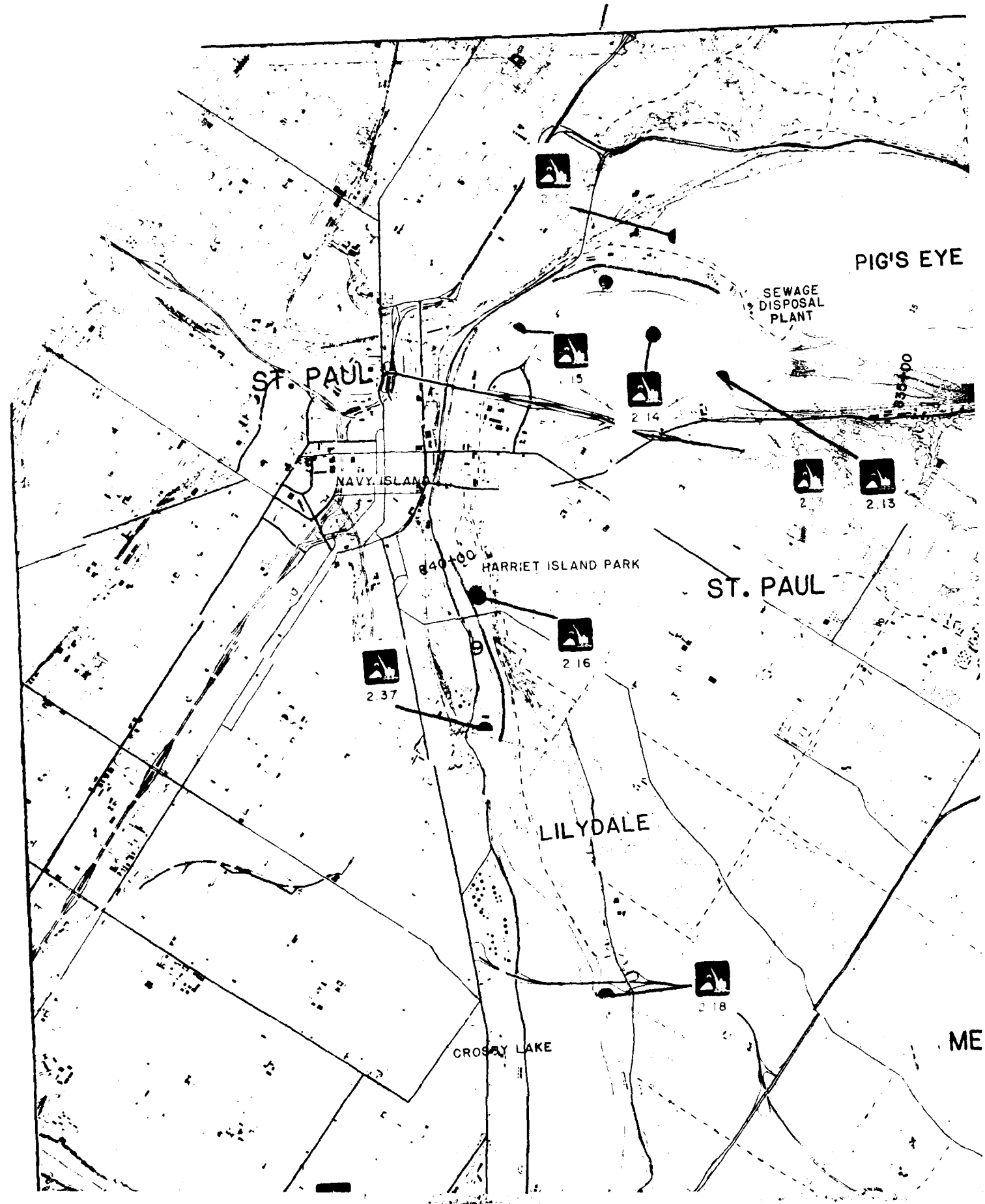
M = Most probable future without GREAT

N = National economic development

E = Environmental quality

R = Removal from floodplain

SCALE: 1" = 4,000'



ST. PAUL

NAVY ISLAND

HARRIET ISLAND PARK

LILYDALE

CROSBY LAKE

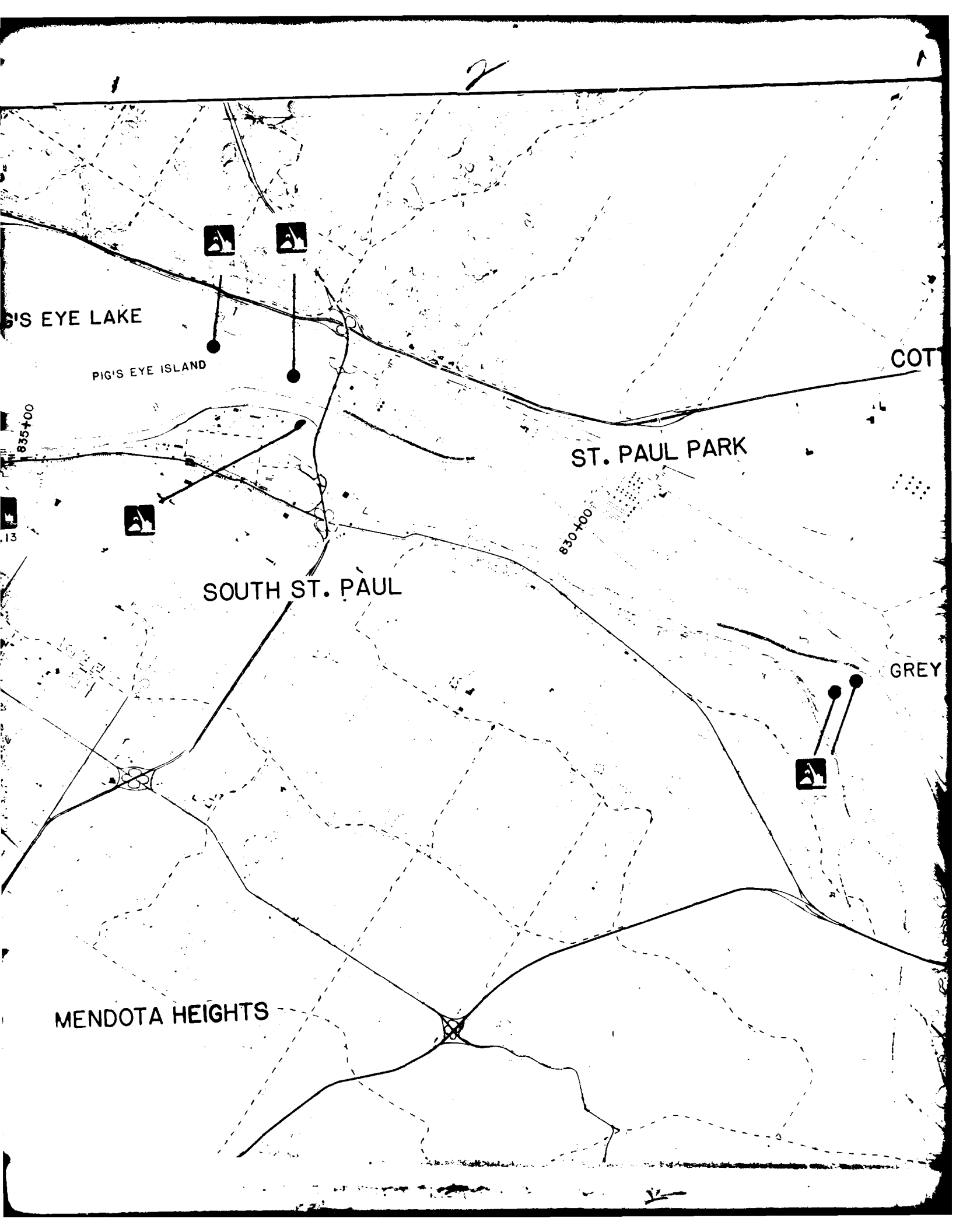
PIG'S EYE

SEWAGE DISPOSAL PLANT

ST. PAUL

ME





1 3

COTTAGE GROVE

GREY CLOUD ISLAND (UPPER)

MOORE LAKE

GREY CLOUD ISLAND (LOWER)

BALDWIN LAKE

825+00  
PINE BEND

820+00  
BOULANGER ISLAND  
SPRING LAKE

L/D



2 27



2 26



2 24



2 25



2 24

3

1

7

L/D NO.2

LAKE REBECCA PARK

LAKE REBECCA

HASTINGS



2 35

820 00

BOULANGER ISLAND



2 3

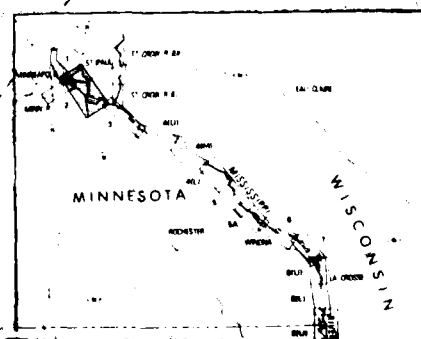
SPRING LAKE

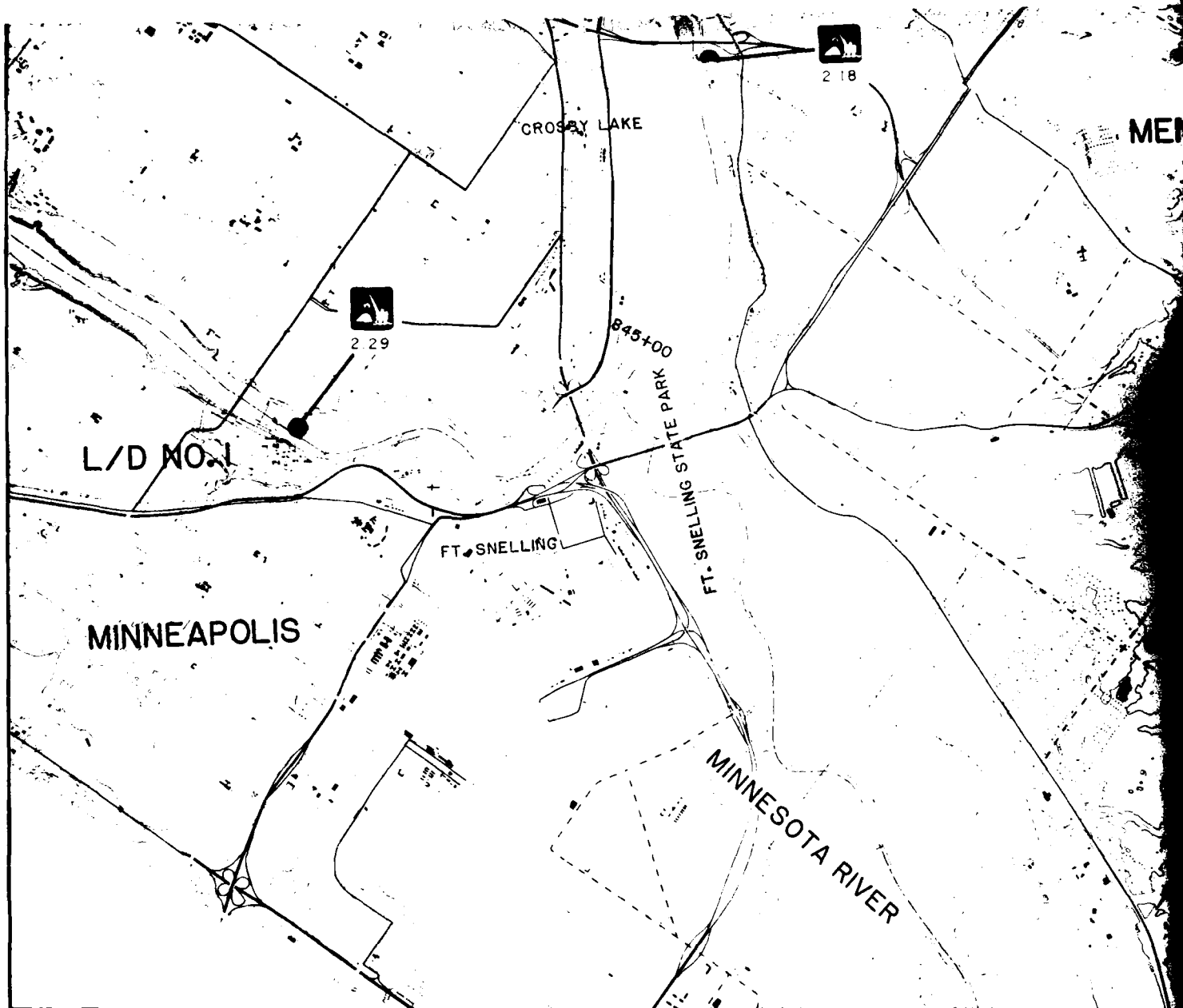


2 24



2 24

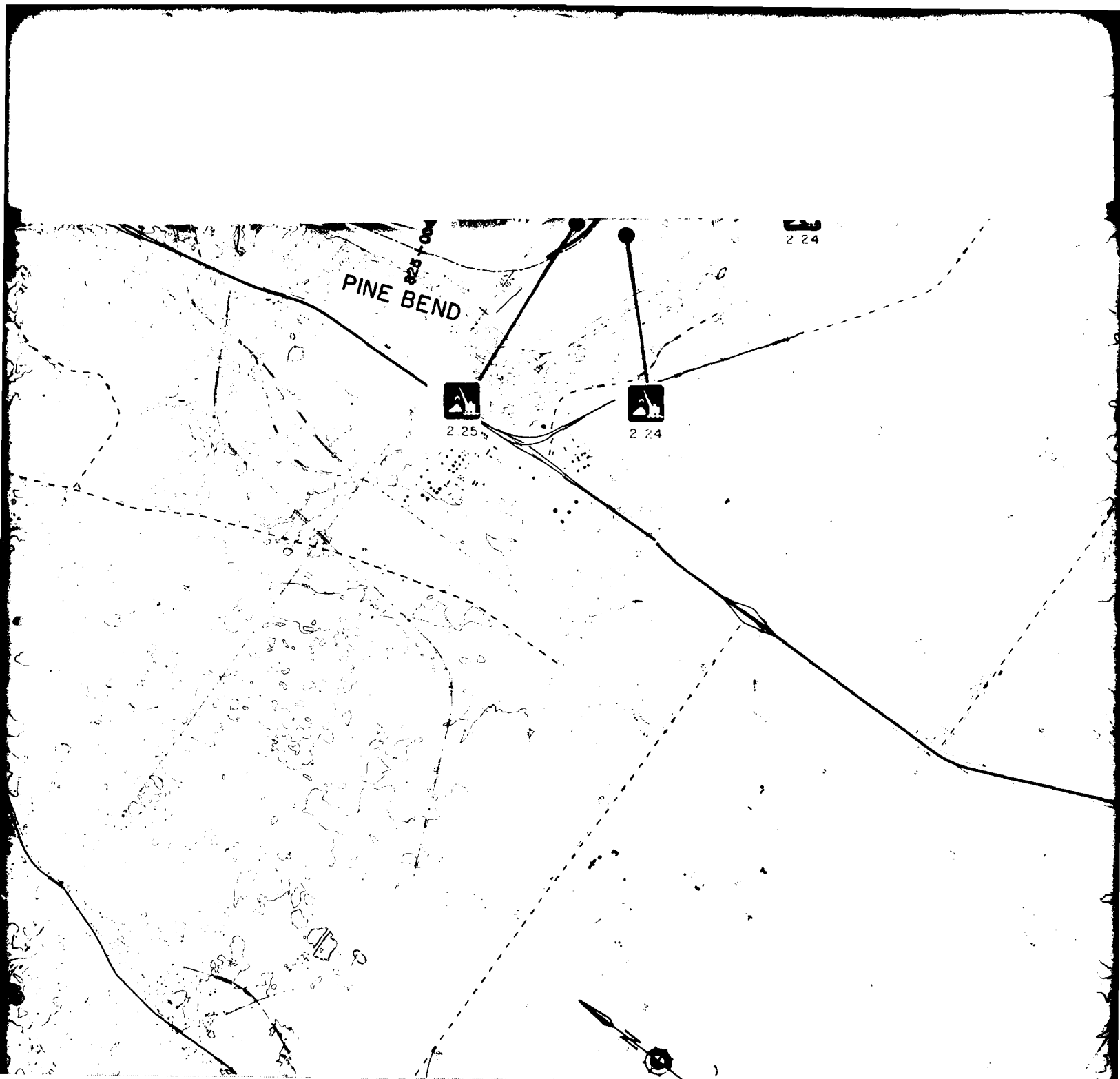






MENDOTA HEIGHTS

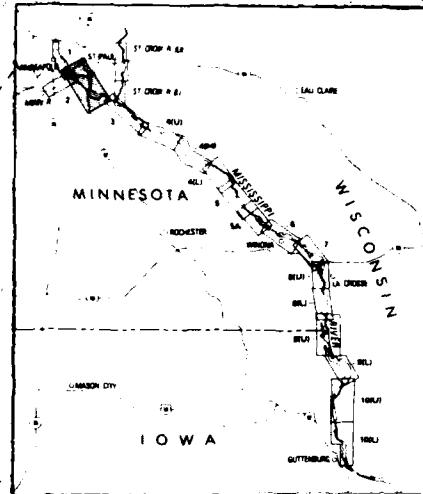
EAGAN



2.24



2.24



**GREAT RIVER ENVIRONMENTAL ACTION TEAM**  
**UPPER MISSISSIPPI RIVER**  
(POOL 2-MILE 815 TO MILE 848)

# LEGEND

## ALTERNATIVE MATERIAL PLACEMENT PLANS



Alternative placement site

4 09

Site number

### POOL 3

DREDGE CUT	ALTERNATIVE PLACEMENT PLANS			
	MPFW / OG	NED	EQ	RFFP
1	3.07	3.07/3.10/3.43	3.09	3.09
2	3.12	3.12	3.09	3.09
3	3.16/3.14	3.16/3.14	3.09	3.17
4	3.21	3.21/3.44	3.09	3.17
5	3.28/3.40	3.28/3.40	3.27	3.18
6	3.30	3.30	3.27	3.03
7	3.33	3.34/3.33	3.46	3.39
8	3.33	3.46	3.46	3.39
9	3.42	3.42	3.46	3.39

M = Most probable future without GREAT

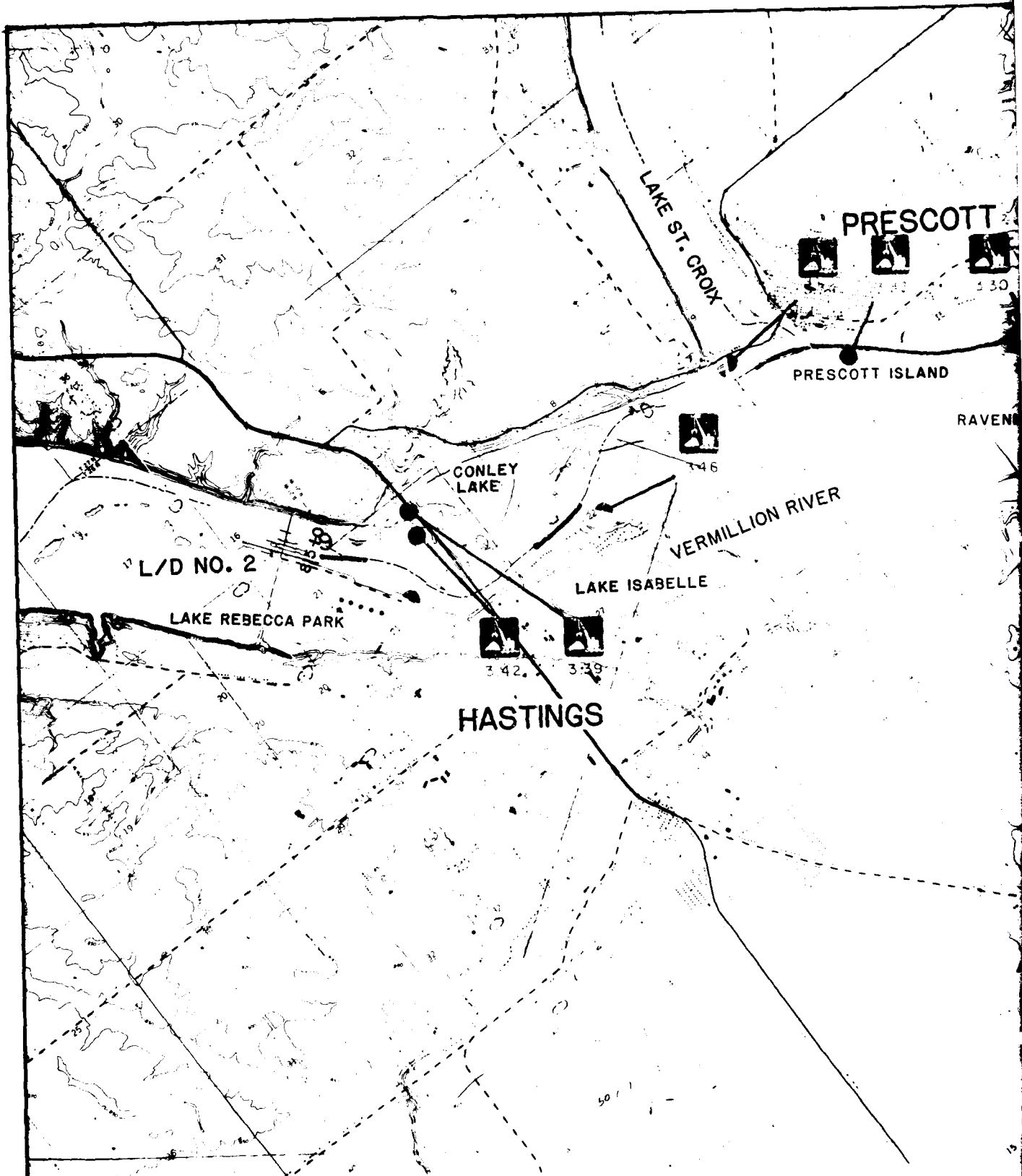
N = National economic development

E = Environmental quality

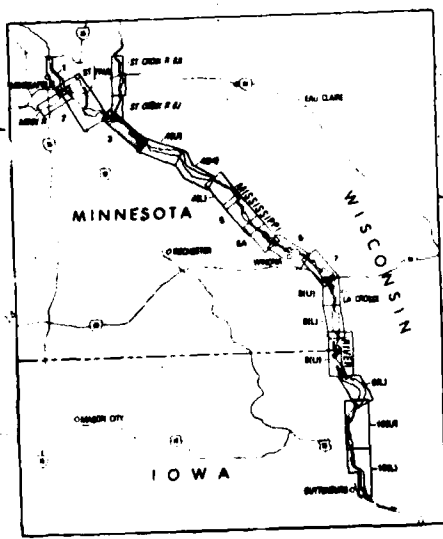
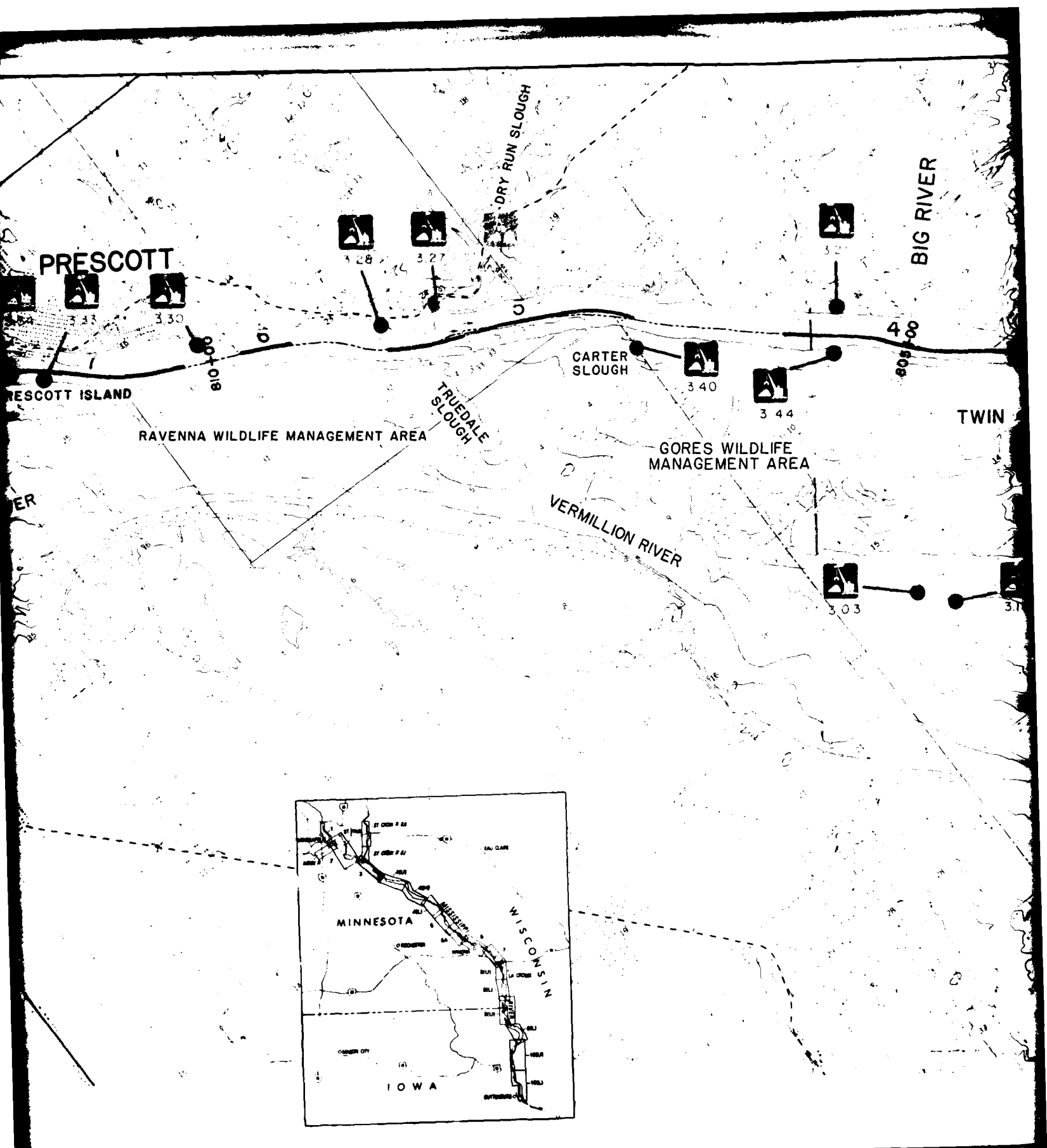
R = Removal from floodplain

SCALE: 1" = 4,000'

CONTOUR INTERVAL: 20 FEET  
NATIONAL GEODETIC VERTICAL DATUM OF 1929



LEGEND



2

3.21

BIG RIVER

4.00  
605.00

TWIN  
LAKE

03

3.7

3.7

3.6

2

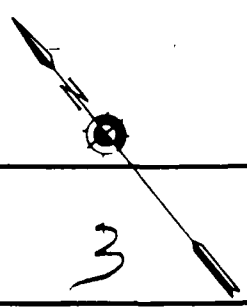
DIAMOND BLUFF

600.00

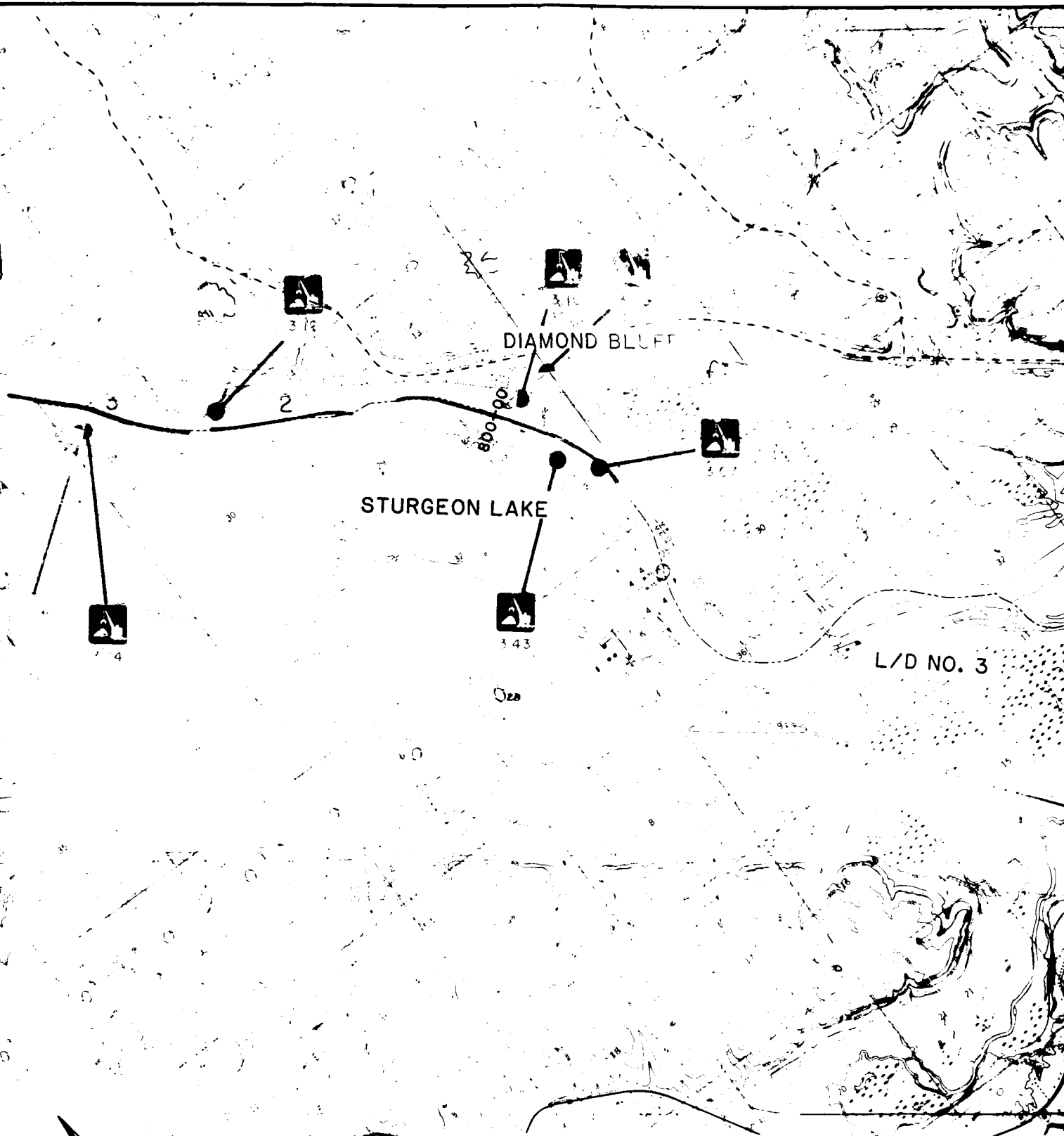
STURGEON LAKE

3.43

3.4



GREAT RIVER ENVIRONM  
UPPER MISSISS  
(POOL 3—MILE 797)



**GREAT RIVER ENVIRONMENTAL ACTION TEAM**  
**UPPER MISSISSIPPI RIVER**  
(POOL 3—MILE 797 TO MILE 816)

3



# LEGEND

## ALTERNATIVE MATERIAL PLACEMENT PLANS



Alternative placement site

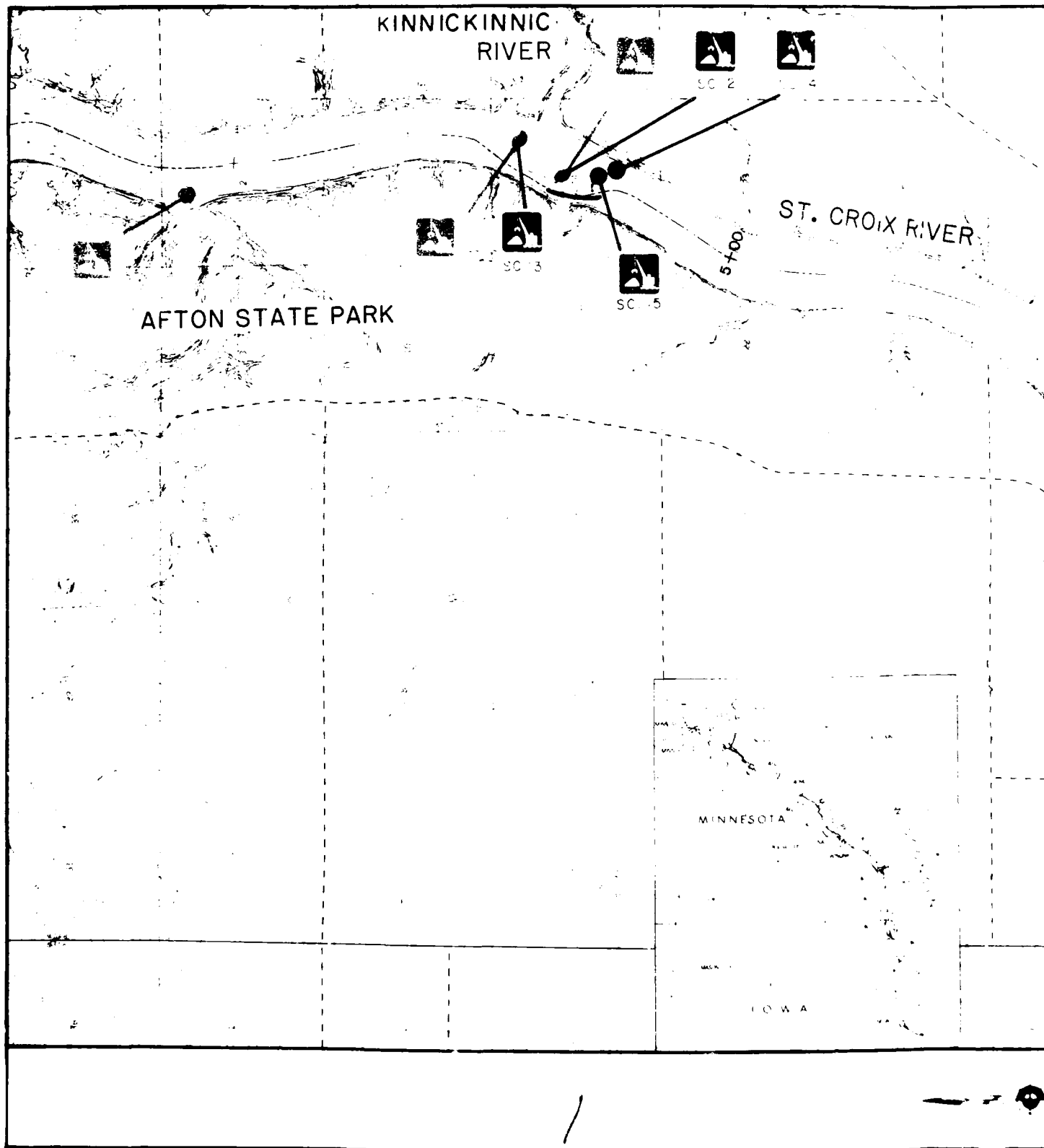
409

Site number

POOL SC				
DREDGE CUT	ALTERNATIVE PLACEMENT PLANS			
	MPFW/OG	NED	EQ	RFFP
1	SC.12/.13/.14/.16/3.34	SC.11/.13/.14/.16/3.34/SC.23	2.10	2.10
2	SC.21/SC.11	SC.21	2.10	2.10
3	SC.03/.04/.17/.05/.06/.07/.18/.22/.23	SC.01/SC.07	SC.07/2.10	2.10

M = Most probable future without GREAT  
 N = National economic development  
 E = Environmental quality  
 R = Removal from floodplain

SCALE 1" = 4,000'



AD-A127 214

GREAT I STUDY OF THE UPPER MISSISSIPPI RIVER TECHNICAL  
APPENDIXES VOLUME 9 ENVIRONMENTAL IMPACT STATEMENT(U)  
GREAT RIVER ENVIRONMENTAL ACTION TEAM SEP 80

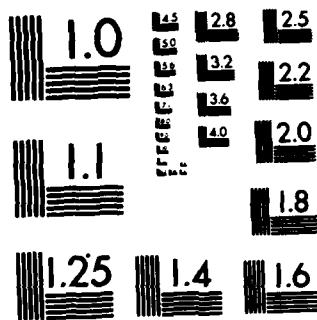
4/4

UNCLASSIFIED

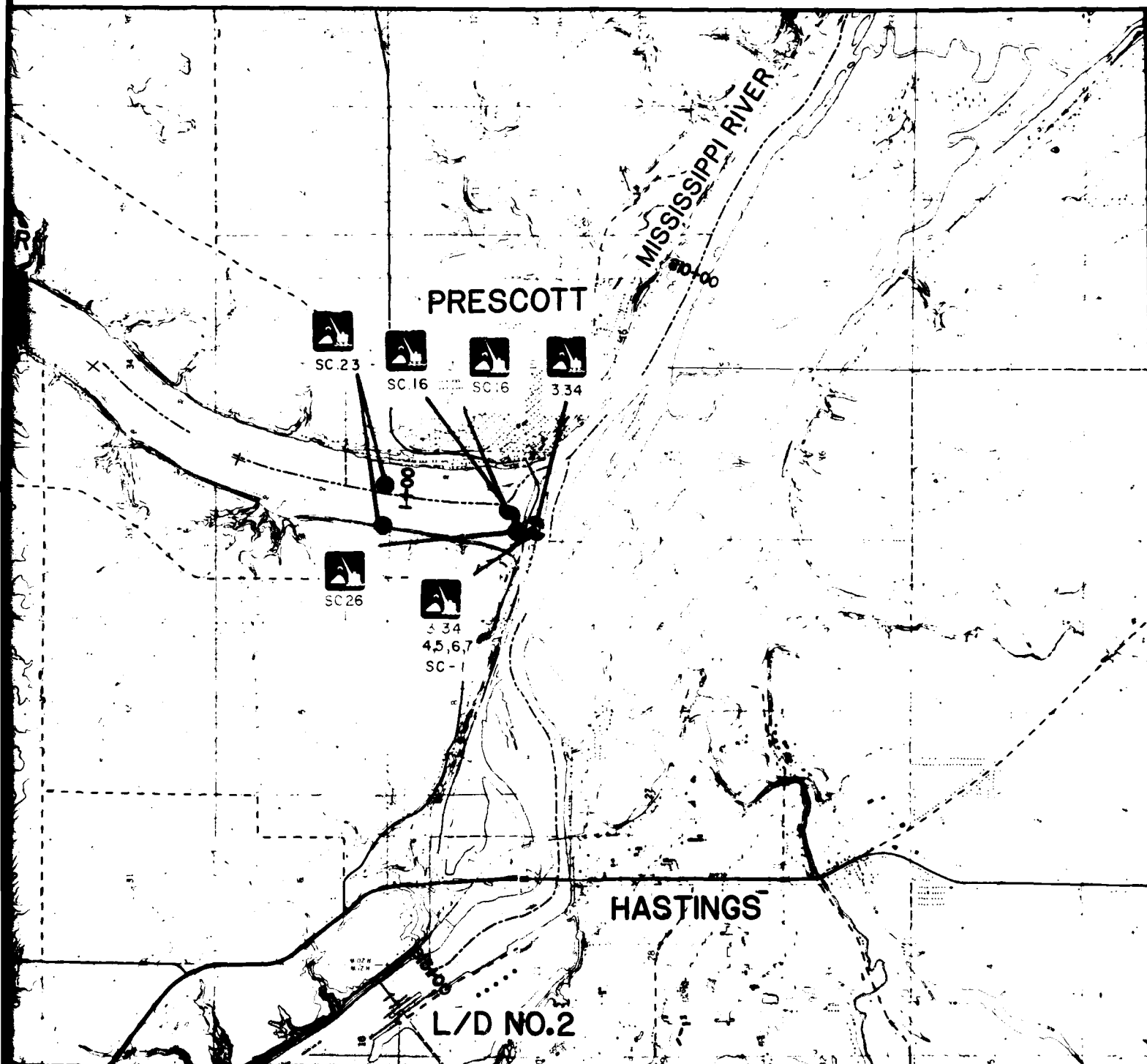
F/G 13/2

NL


END  
DATE  
FILMED  
5-83  
DTIC

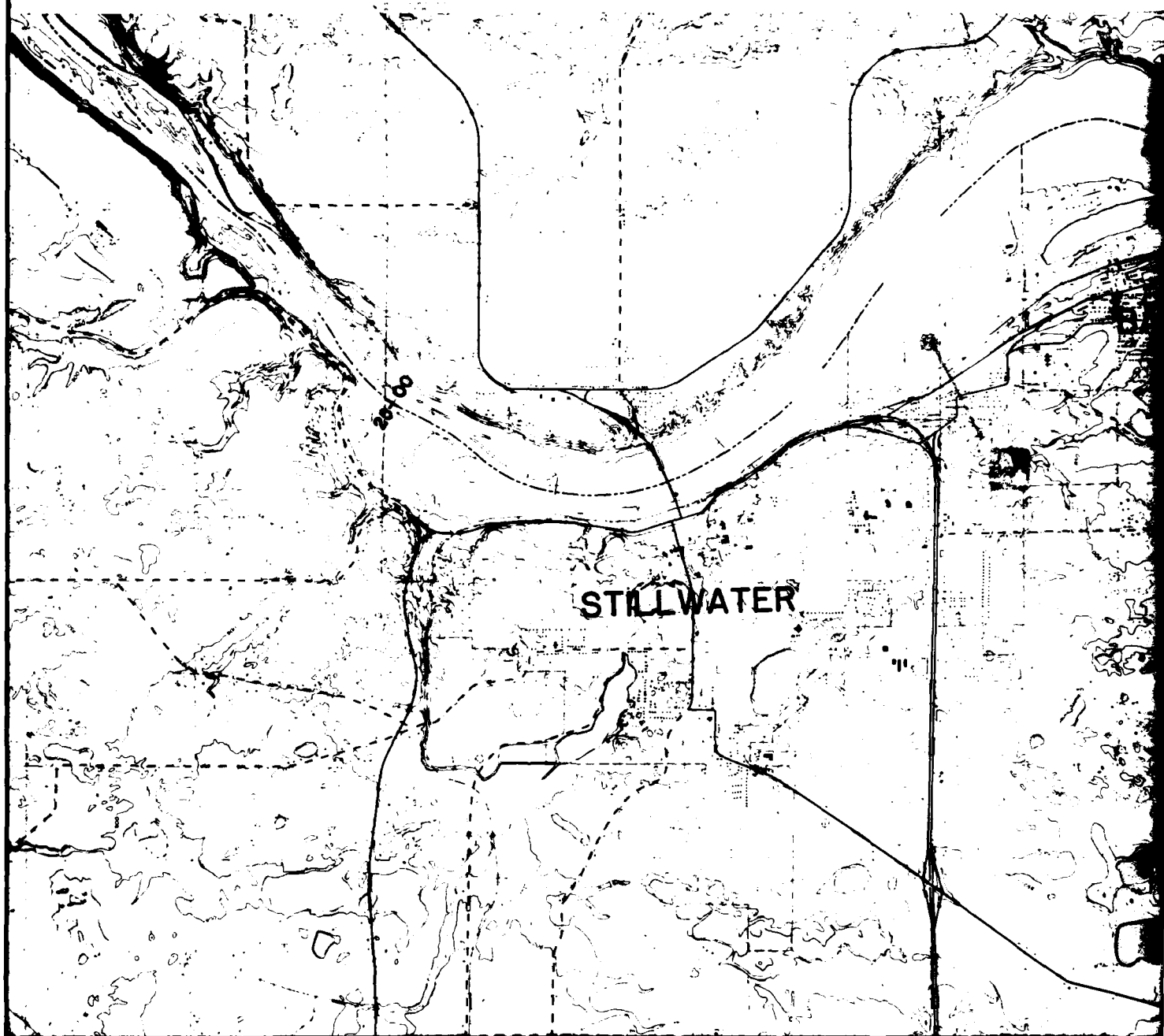


MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A



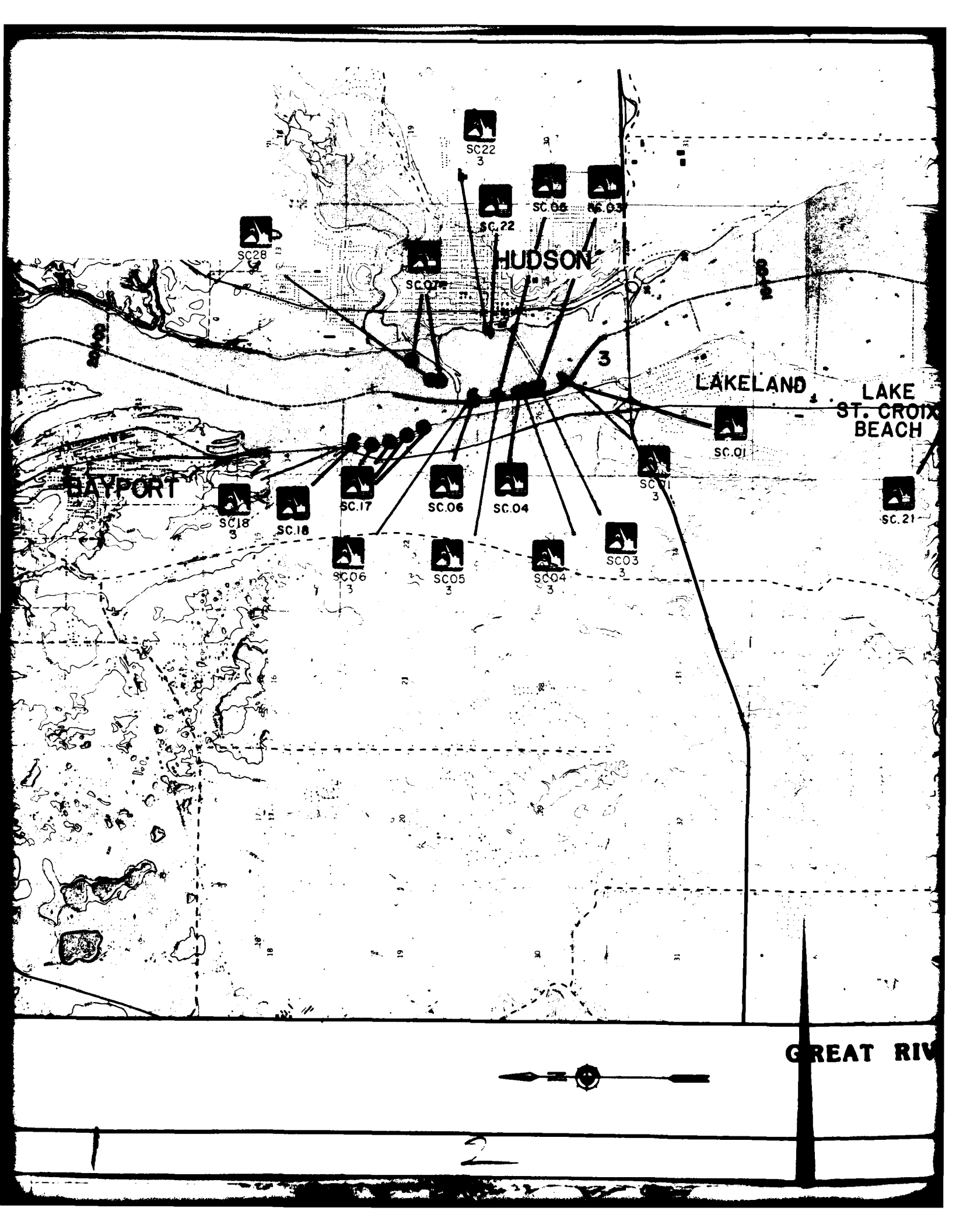
**GREAT RIVER ENVIRONMENTAL ACTION TEAM**  
**ST. CROIX RIVER (L)**  
(MILE 0 TO MILE 9)

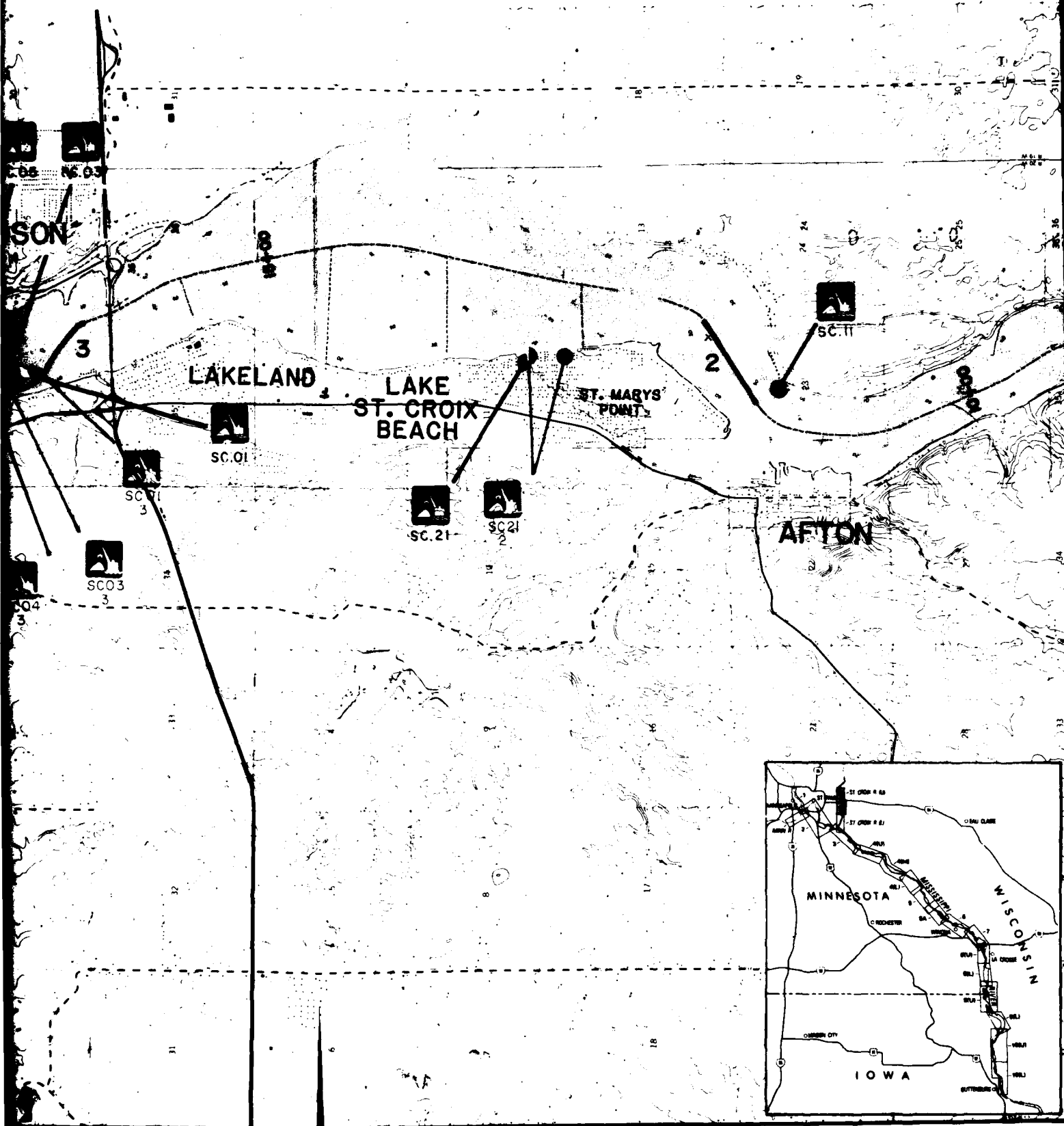
2



LEGEND

1






**GREAT RIVER ENVIRONMENTAL ACTION TEAM**  
**ST. CROIX RIVER (U)**  
(MILE 10 TO MILE 24)




# LEGEND

## RECOMMENDED CHANNEL MAINTENANCE PLAN

- 5 — Dredge cut number  
 — Location of dredge cut
-  — Recommended placement site
- 2.06 T — Site number  
 3,4,5 — S = Special conditions on use  
           T = Temporary use site  
           — Dredge cuts for which site is used  
           — Parentheses if site is used for placement of material from a cut in another pool

## ALTERNATIVE MATERIAL PLACEMENT PLANS

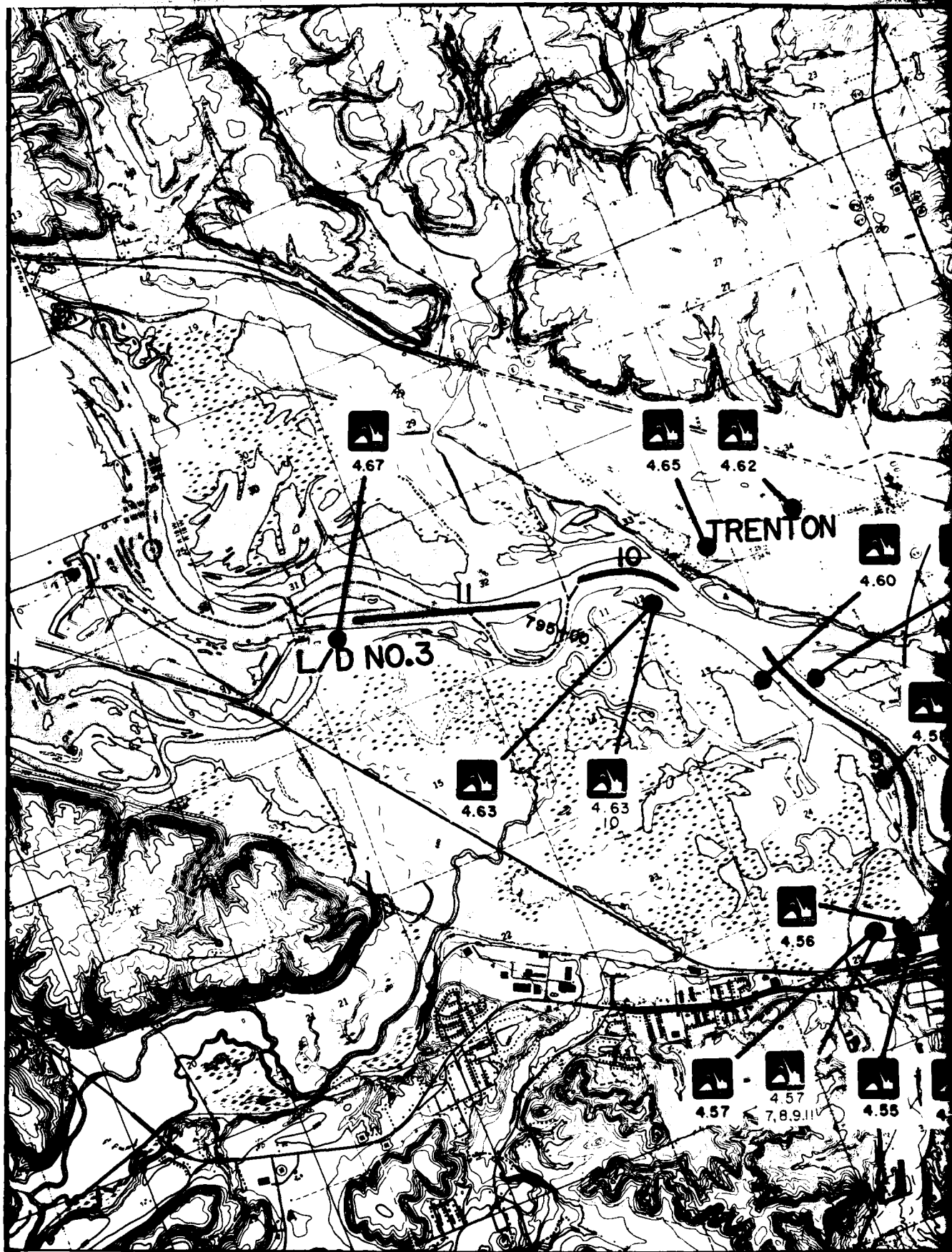
-  — Alternative placement site  
 4.09 — Site number

POOL 4(U)				
DREDGE CUT	ALTERNATIVE PLACEMENT PLANS			
	MPFW/OG	NED	EQ	RFFP
1	4.68	4.68	4.37	4.34/4.35/4.36
2	4.51	4.47/4.48/ 4.49/4.51	4.54/4.57	4.34/4.35/4.36
3	4.52	4.54/4.55/4.56	4.54/4.57	4.34/4.35/4.36
4	4.58	4.52/4.58/4.59	4.54/4.57	4.34/4.35/4.36
5	4.63	4.60/4.63	4.57	4.62/4.65
6	4.67	4.67	4.57	4.62/4.65

M = Most probable future without GREAT  
 N = National economic development  
 E = Environmental quality  
 R = Removal from floodplain

SCALE: 1" = 4,000'







BAY CITY

LAKE PEPIN

788+00

6



4.68



4.36



4.34



4.47



4.47



4.37



4.37

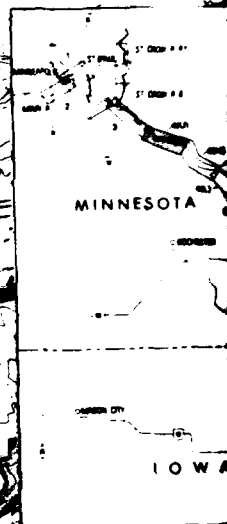


4.35



4.79

VILLE PARK



**GREAT RIVER ENVIRONMENTAL**  
**UPPER MISSISSIPPI R**  
(POOL 4(U)—MILE 781 TO MILE 7

3

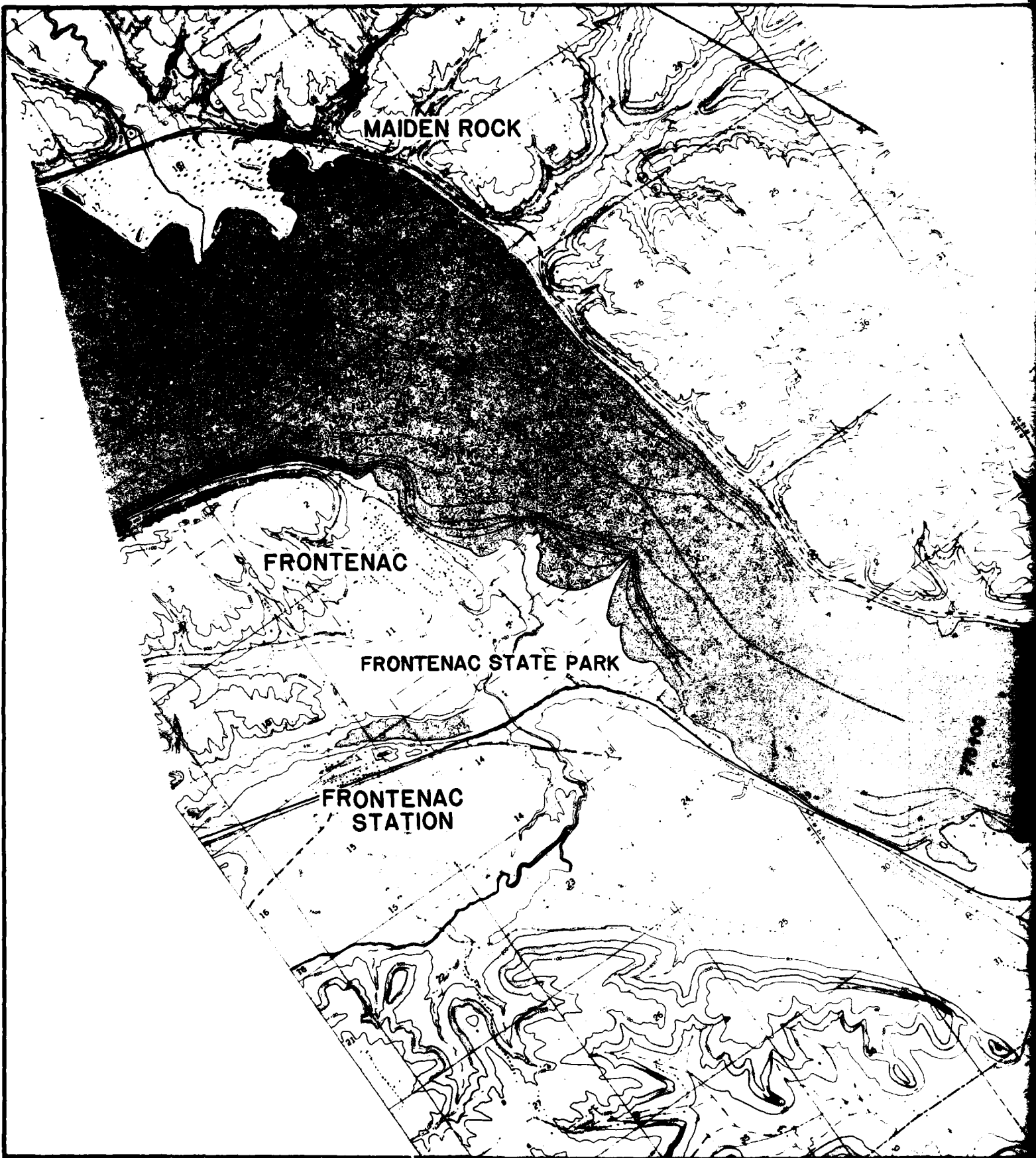


MAIDEN ROCK

FRONTENAC

FRONTENAC STATE PARK

FRONTENAC  
STATION



STOCKHOLM

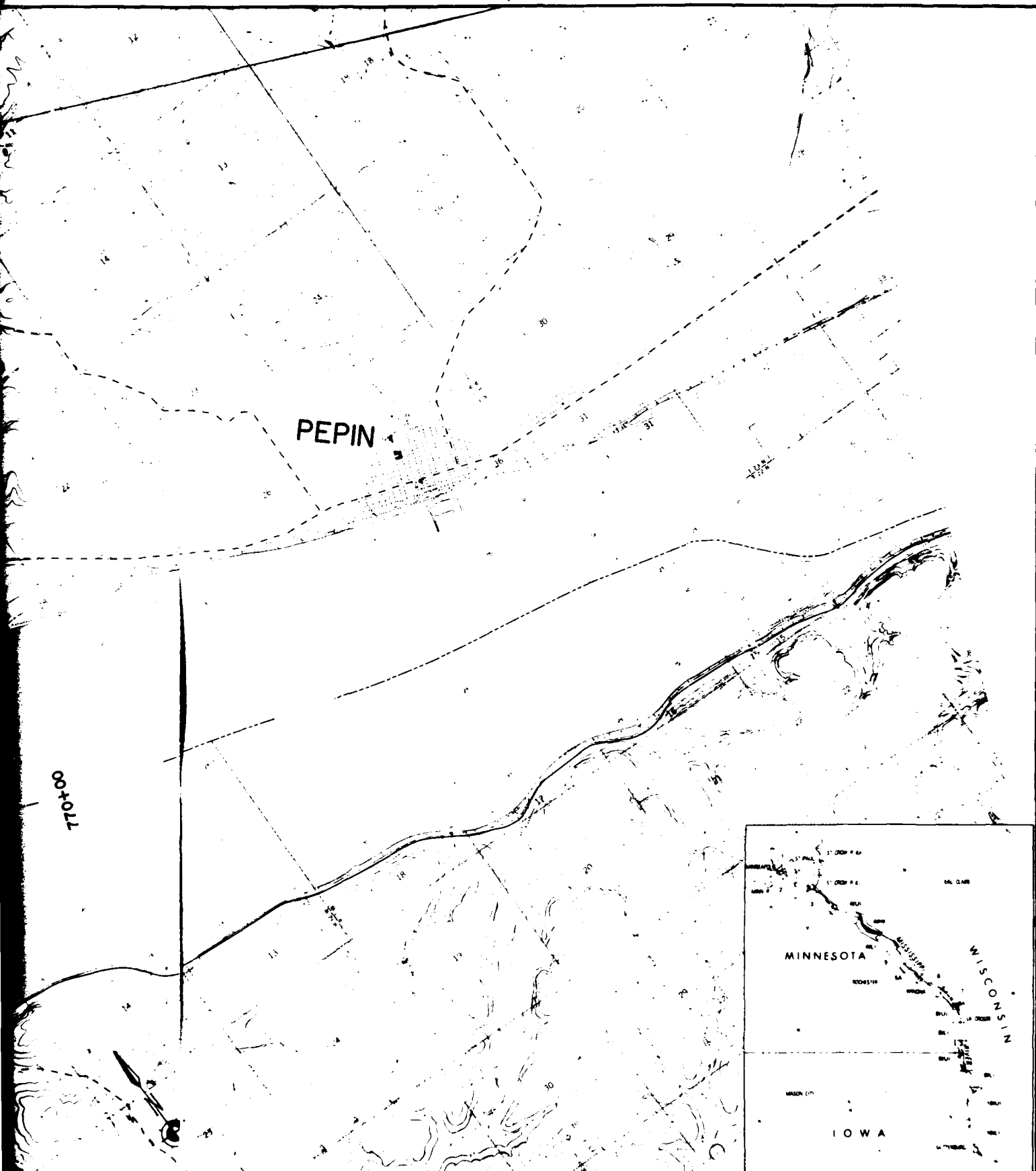
LAKE PEPIN

775+00

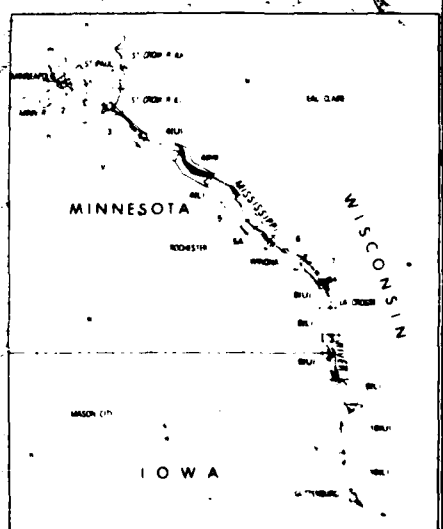
770+00

LAKE CITY





00+01



**GREAT RIVER ENVIRONMENTAL ACTION TEAM**  
**UPPER MISSISSIPPI RIVER**  
(POOL 4(M)-MILE 766 TO MILE 780)

1 3



# LEGEND

## RECOMMENDED CHANNEL MAINTENANCE

5 • Recommended Channel Maintenance



Recommended Channel Maintenance is shown on the map by a solid line. The line is labeled with the recommended channel maintenance number, which is the number of the recommended channel maintenance plan that is shown in the table below.

## ALTERNATIVE MATERIAL PLACEMENT PLANS



Alternative placement site

409 Site number

### POOL 4(L)

DREDGE CUT	ALTERNATIVE PLACEMENT PLANS			
	MPFW/OG	NED	EQ	RFFP
1	4.04	4.04	4.04	4.04
2	4.04/4.10	4.04/4.10	4.04	4.04
3	4.13	4.13	4.04	4.04/4.25
4	4.16/4.17	4.16	4.20/4.18	4.25/4.24
5	4.29	4.29	4.24	4.24

M = Most probable future without GREAT  
 N = National economic development  
 E = Environmental quality  
 R = Removal from floodplain

SCALE: 1" = 4,000'

CONTOUR INTERVAL 20 FEET  
 NATIONAL GEODETIC VERTICAL DATUM OF 1929



LSON

WILD LIFE & FISH REFUGE  
(A DISTRICT)

ABASHA

ROBINSON LAKE

TEEPEEOTA  
POINT

BUFFALO (BEEF)  
SLOUGH

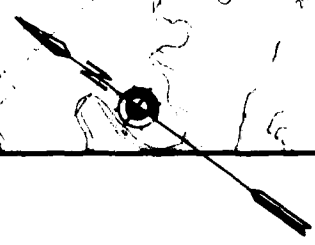
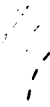
PETERSO

SAND

ELL

GREAT RIVER

PEE  
(POC)



2

4.10 4.07  
2

BUFFALO (BEEF)  
BLOUGH

4.04 4.02  
1,2,3

ALMA  
L/D NO.4

TEEPEEOTA  
POINT

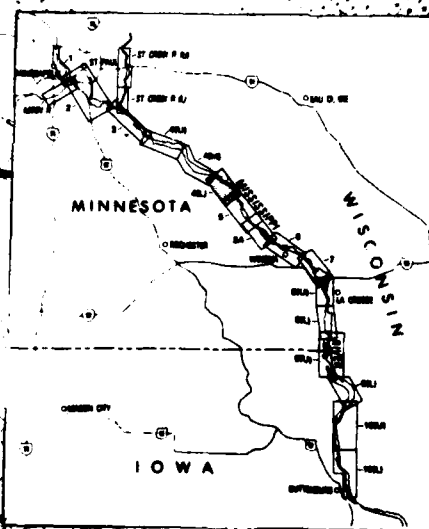
PETERSON LAKE

FINGER LAKES

SAND PRAIRIE

4.17

ELLOGG



**GREAT RIVER ENVIRONMENTAL ACTION TEAM**  
**UPPER MISSISSIPPI RIVER**  
(POOL 4(L)-MILE 752 TO MILE 766)

N

3

## LEGEND

## RECOMMENDED CHANNEL MAINTENANCE PLAN

5. \_\_\_\_\_ - the largest number

\_\_\_\_\_



2067  
3.45

 **—** *How to Write a Book* by **WILLIAM ZINSSER**

2067

3.4.5 •

[illegible]

## ALTERNATIVE MATERIAL PLACEMENT PLANS



4.09



Alternative placement site

4.09 \_\_\_\_\_ Site number

**POOL 5**

DREDGE CUT	ALTERNATIVE PLACEMENT PLANS			
	MPFW/OG	NED	EQ	RFFP
1	5.03	5.03	5.30/5.03	5.24
2	5.06	5.06	5.30	5.24
3	5.07	5.07	5.30	5.24
4	5.12	5.12	5.30	5.24
5	5.14	5.14	5.24	5.24
6	5.18	5.18	5.24	5.28
7	5.21	5.21	5.24	5.22
8	5.29	5.25	5.24	5.24

M = Most probable future without GREAT

N = National economic development

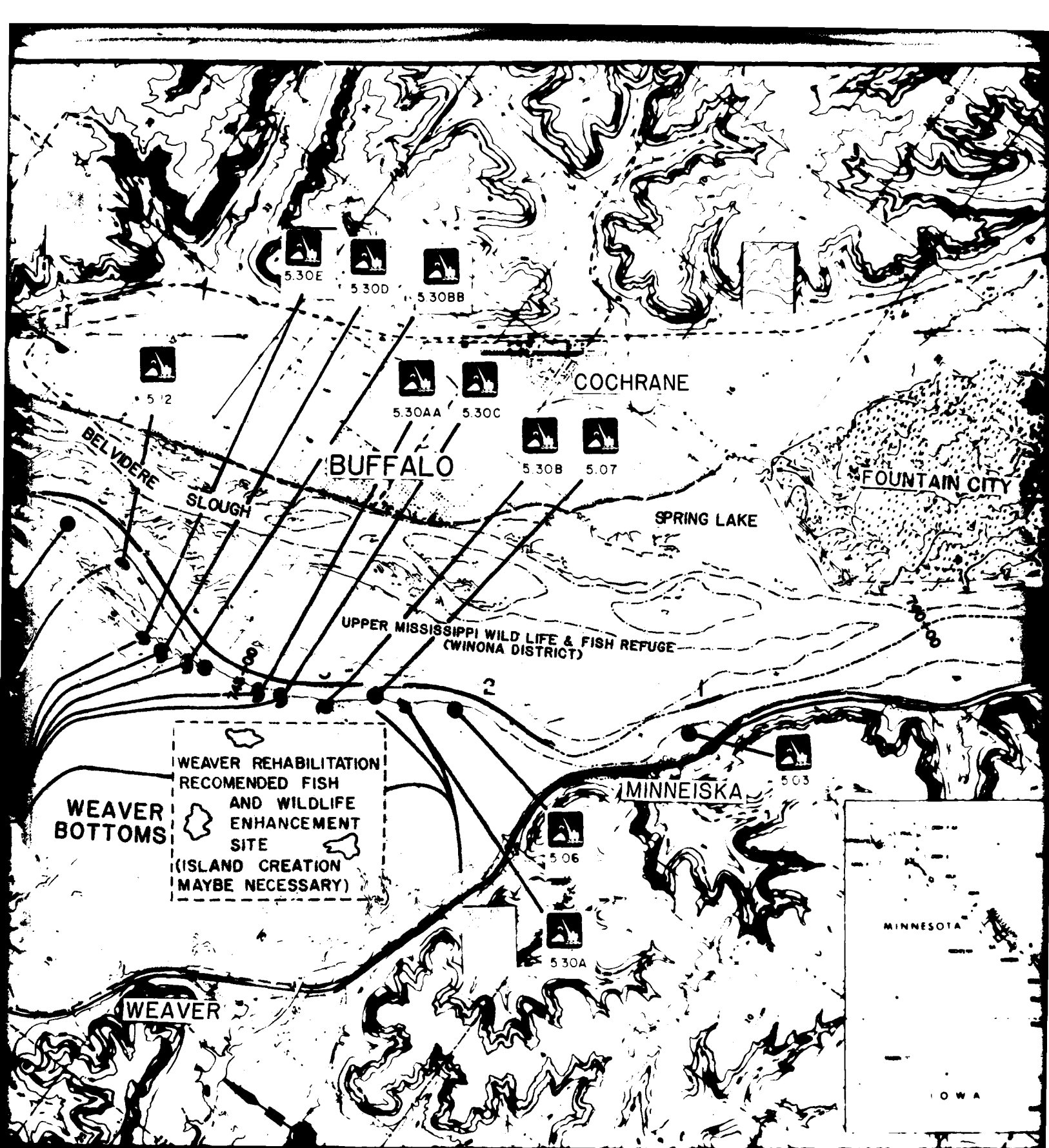
E = Environmental quality

R = Removal from floodplain

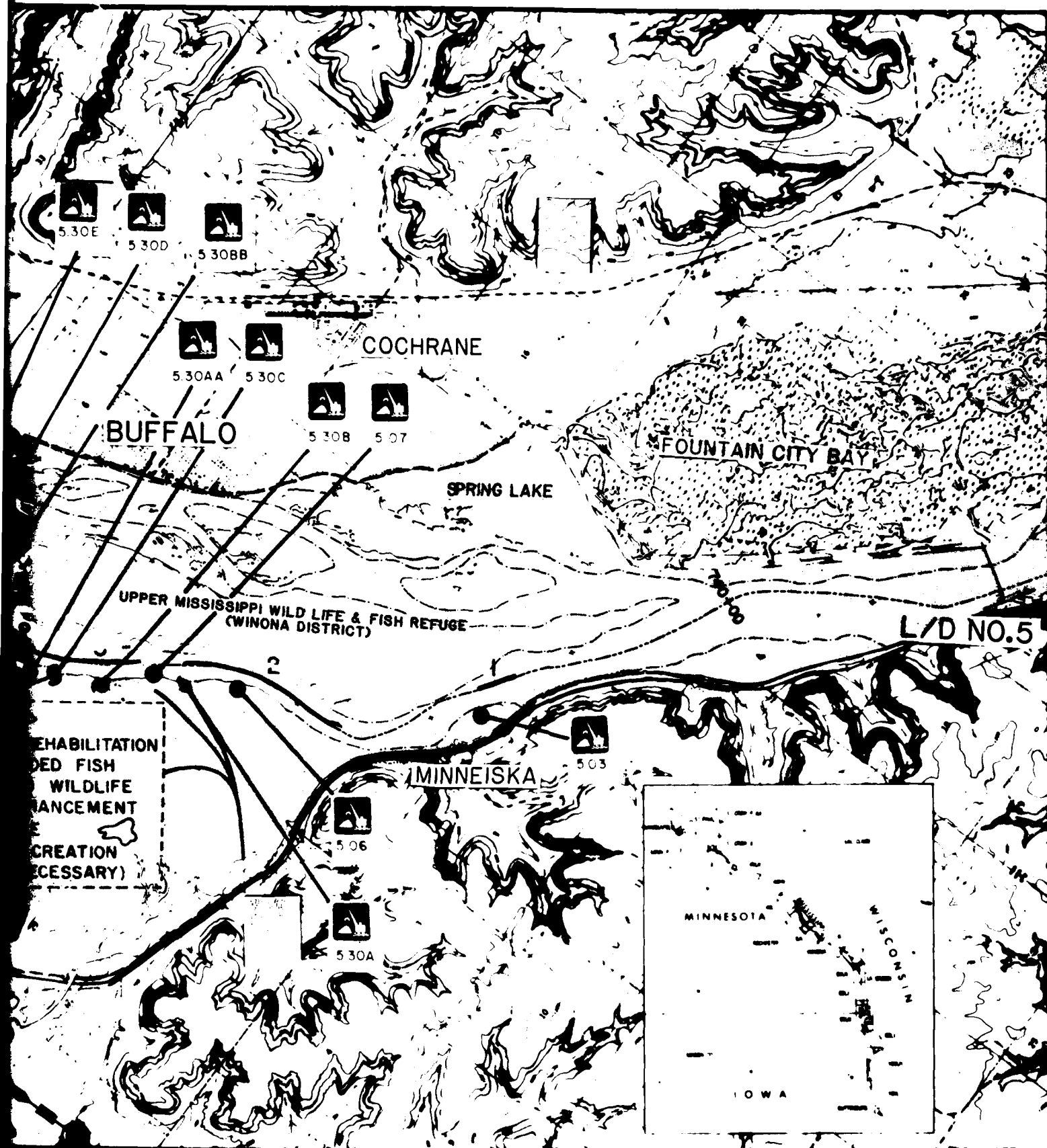
**SCALE: 1" = 4,000'**







**GREAT RIVER ENVIRONMENTAL A  
UPPER MISSISSIPPI RIV**  
(POOL 5—MILE 738 TO MILE 753)



**GREAT RIVER ENVIRONMENTAL ACTION TEAM**  
**UPPER MISSISSIPPI RIVER**  
(POOL 5—MILE 738 TO MILE 753)



# LEGEND

## RECOMMENDED CHANNEL MAINTENANCE PLAN

5 - Channel maintenance plan



4.09

## ALTERNATIVE MATERIAL PLACEMENT PLANS



4.09

Alternative placement site

Site number

### POOL 5A

DREDGE CUT	ALTERNATIVE PLACEMENT PLANS			
	MPFW/OG	NED	EQ	RFFP
1	5A.04	5A.04	5A.35	5A.19
2	5A.08	5A.08	5A.35	5A.19
3	5A.32	5A.25	5A.25/5A.27/5A.33	5A.25/5A.27/5A.33
4	5A.34	5A.34	5A.20/5A.27/5A.33	5A.20
5	5A.14	5A.14	5A.27/5A.33/ 5A.20/5A.21	5A.27/5A.33/ 5A.20/5A.21
6	5A.23	5A.23	5A.27/5A.33/ 5A.20/5A.21	5A.27/5A.33/ 5A.20/5A.21

M = Most probable future without GREAT

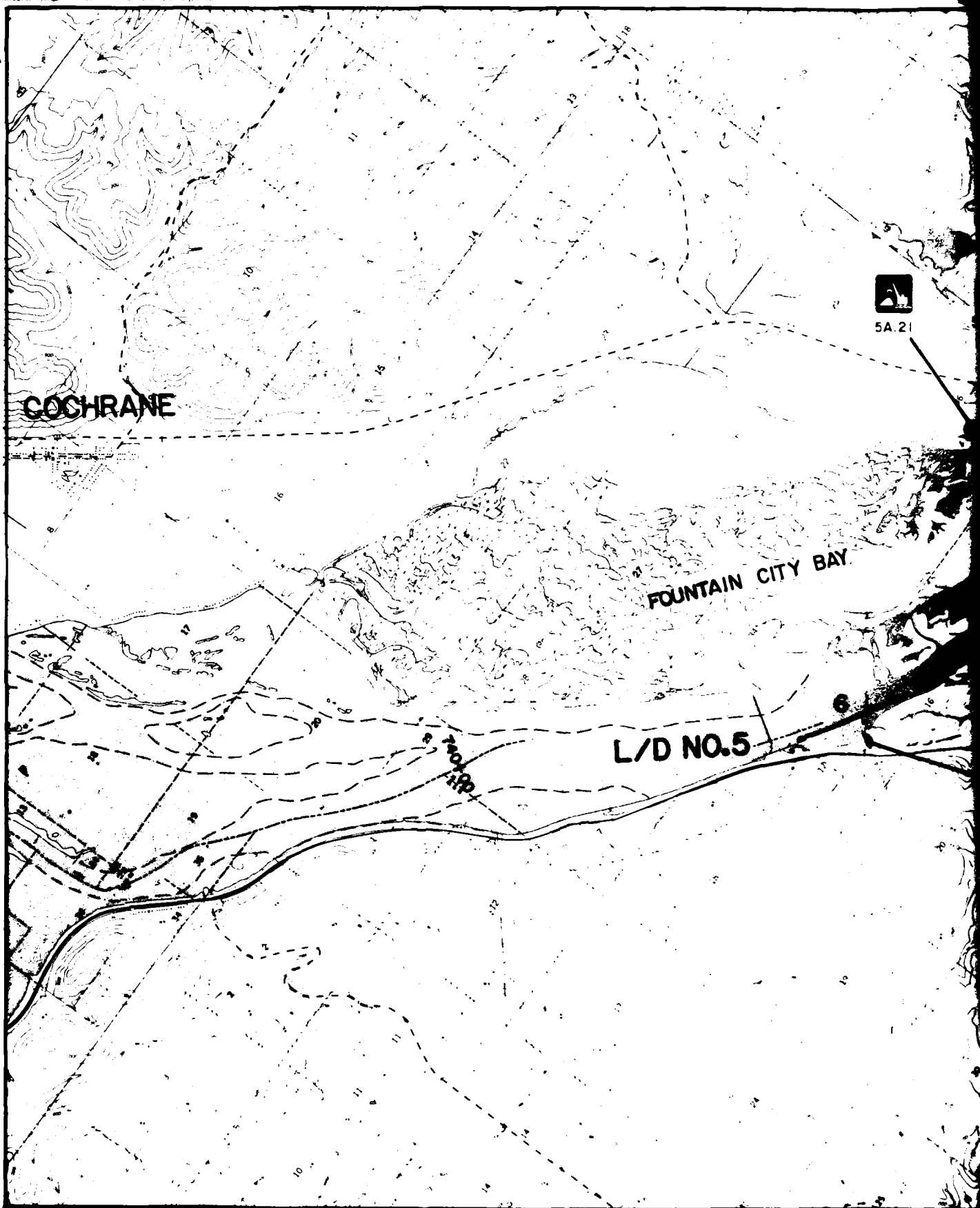
N = National economic development

E = Environmental quality

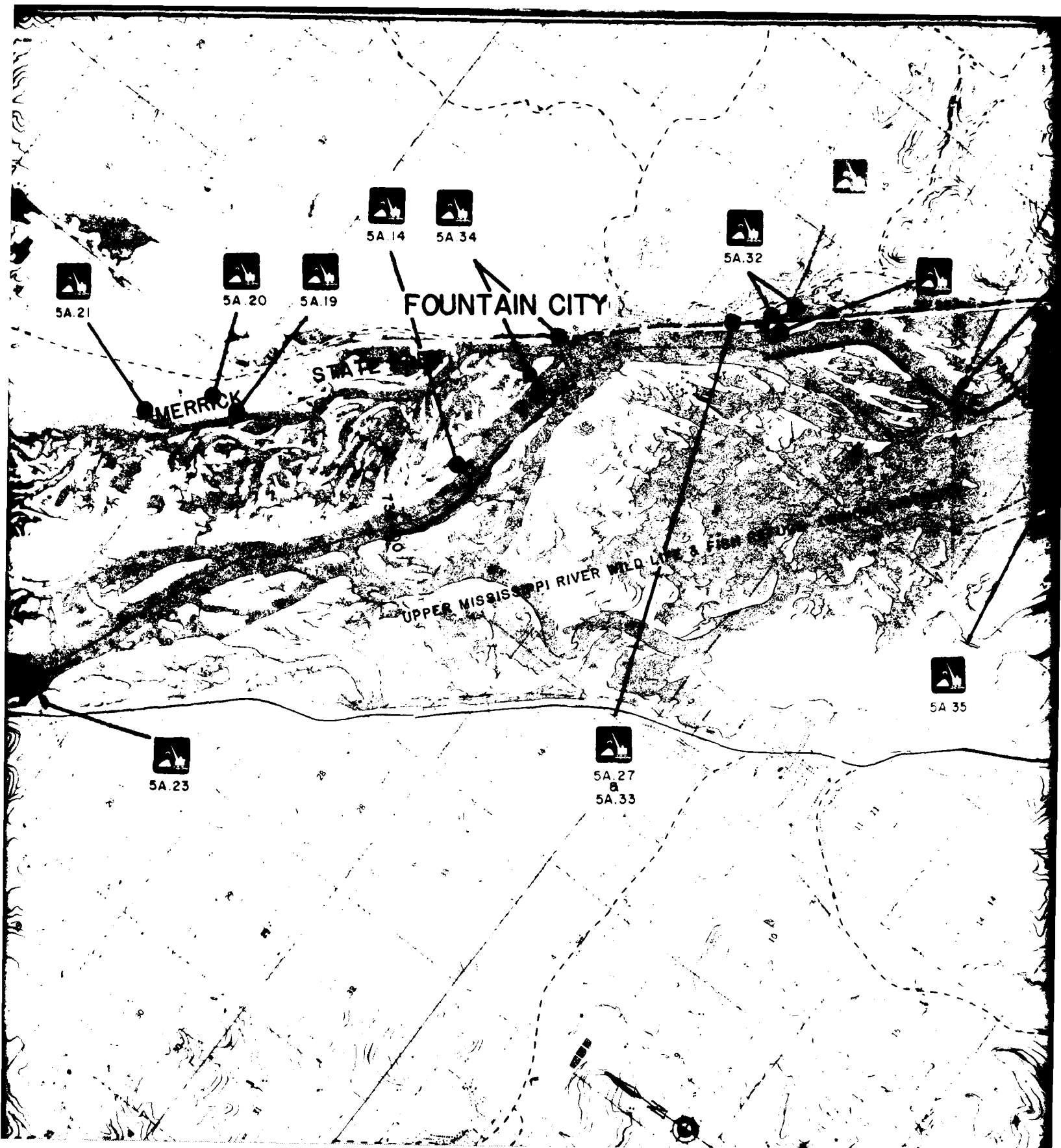
R = Removal from floodplain

SCALE: 1" = 4,000'





----- FLOODWAY DESIGNATED BY LOCAL ORDINANCE





**GREAT RIVER ENVIRONMENTAL ACTION TEAM**  
**UPPER MISSISSIPPI RIVER**  
(POOL 5A-MILE 728 TO MILE 742)

# LEGEND

## RECOMMENDED CHANNEL MAINTENANCE PLAN

5



2.06 T  
3,4,5

## ALTERNATIVE MATERIAL PLACEMENT PLANS



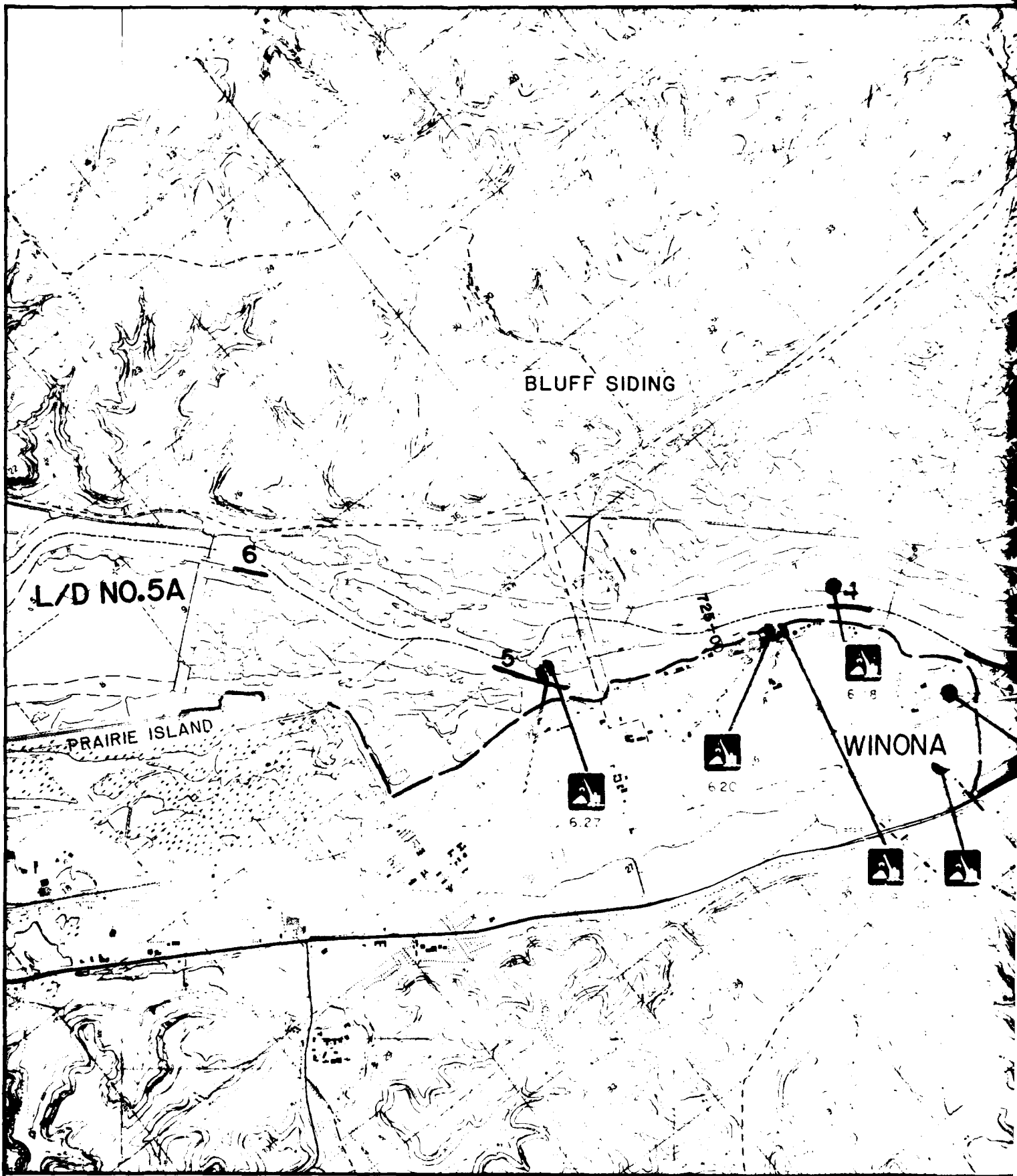
Alternative placement site  
4.09 Site number

POOL 6				
DREDGE CUT	ALTERNATIVE PLACEMENT PLANS			
	MPFW/OG	NED	EQ	RFFP
1	6.10	6.11	6.11	6.17
2	6.14	6.14	6.19/6.20	6.17
3	6.16/6.17	6.17	6.19/6.20	6.17
4	6.18	6.16	6.19/6.20	6.19/6.20
5	6.27	6.27	6.27	6.20
6	6.27	6.27	6.27	6.20

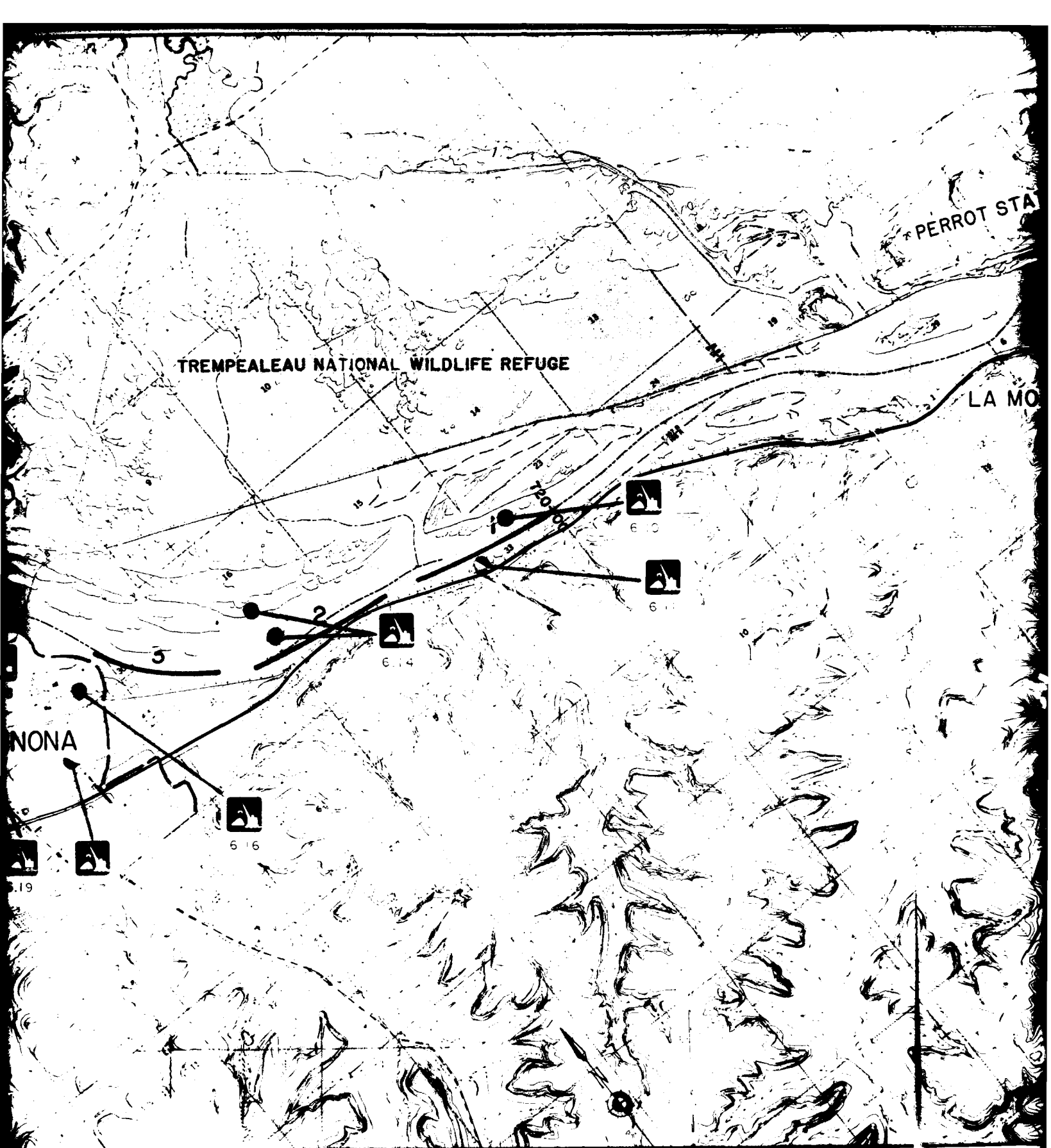
M = Most probable future without GREAT  
N = National economic development  
E = Environmental quality  
R = Removal from floodplain

SCALE: 1" = 4,000'

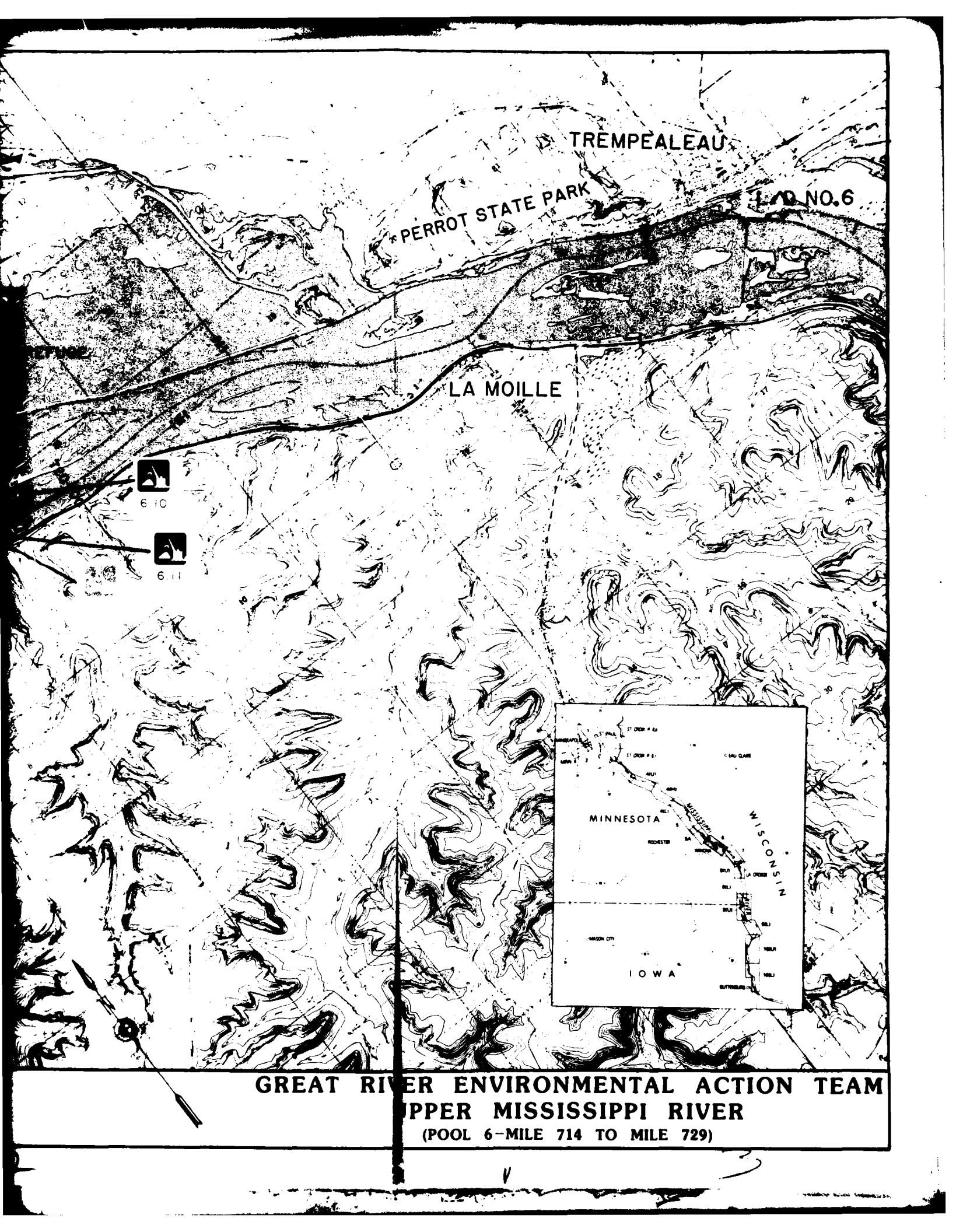
CONTOUR INTERVAL 20 FEET  
NATIONAL GEODETIC VERTICAL DATUM OF 1929



— FLOODWAY DESIGNATED BY LOCAL ORDINANCE



GREAT RIVER ENV  
UPPER M  
(POOL 6-E)



TREMPEALEAU

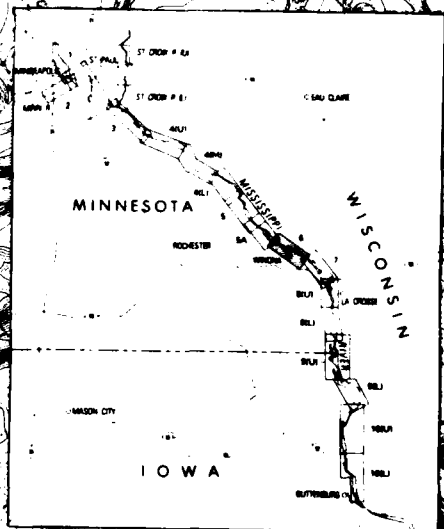
PERROT STATE PARK

LA MOILLE NO. 6

LA MOILLE

6.10

6.11



**GREAT RIVER ENVIRONMENTAL ACTION TEAM**  
**UPPER MISSISSIPPI RIVER**  
(POOL 6-MILE 714 TO MILE 729)



# LEGEND

CONTINUED FROM SHEET 1



4.09

Alternative placement site

Site number

## ALTERNATIVE MATERIAL PLACEMENT PLANS



4.09

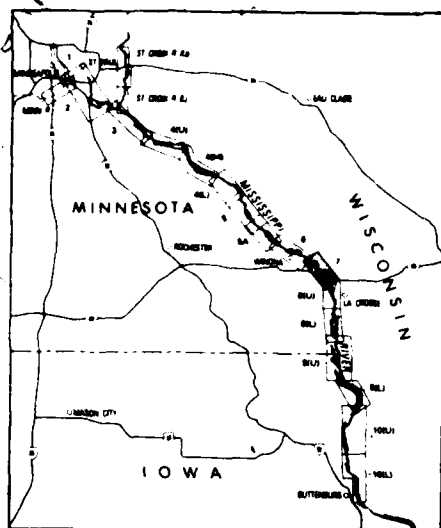
### POOL 7

DREDGE CUT	ALTERNATIVE PLACEMENT PLANS			
	MPFW/OG	NED	EQ	RFFP
1	7.18	7.01	7.01	7.01
2	7.13	7.18	7.04	7.04
3	7.12	7.12	7.04	7.06
4	7.11	7.11	7.04	7.06
5	7.10	7.10	7.04	7.06
6	7.04/7.09	7.04	7.04	7.06
7	7.06	7.06	7.06	7.06

M = Most probable future without GREAT  
 N = National economic development  
 E = Environmental quality  
 R = Removal from floodplain

SCALE: 1" = 4,000'

CONTINUED FROM SHEET 1  
 CONTOUR INTERVAL 20 FEET  
 NATIONAL DATUM VERTICAL DATUM OF 1929



7.06

TREMPEALEAU

L/D NO.6

UPPER MISSISSIPPI RIVER WILD LIFE & FISH REFUGE  
(LA CROIX DISTRICT)

RICHMOND ISLAND

LA MOILLE



7.04



7.09



7.10



7.11

--- FLOODWAY DESIGNATED BY LOCAL ORDINANCE

BLACK RIVER

BRICE PRAIRE

LAKE ONALASKA

WILSON REFUGE

UPPER MISSISSIPPI RIVER WILD LIFE & FISH  
(LA CROSSE DISTRICT)

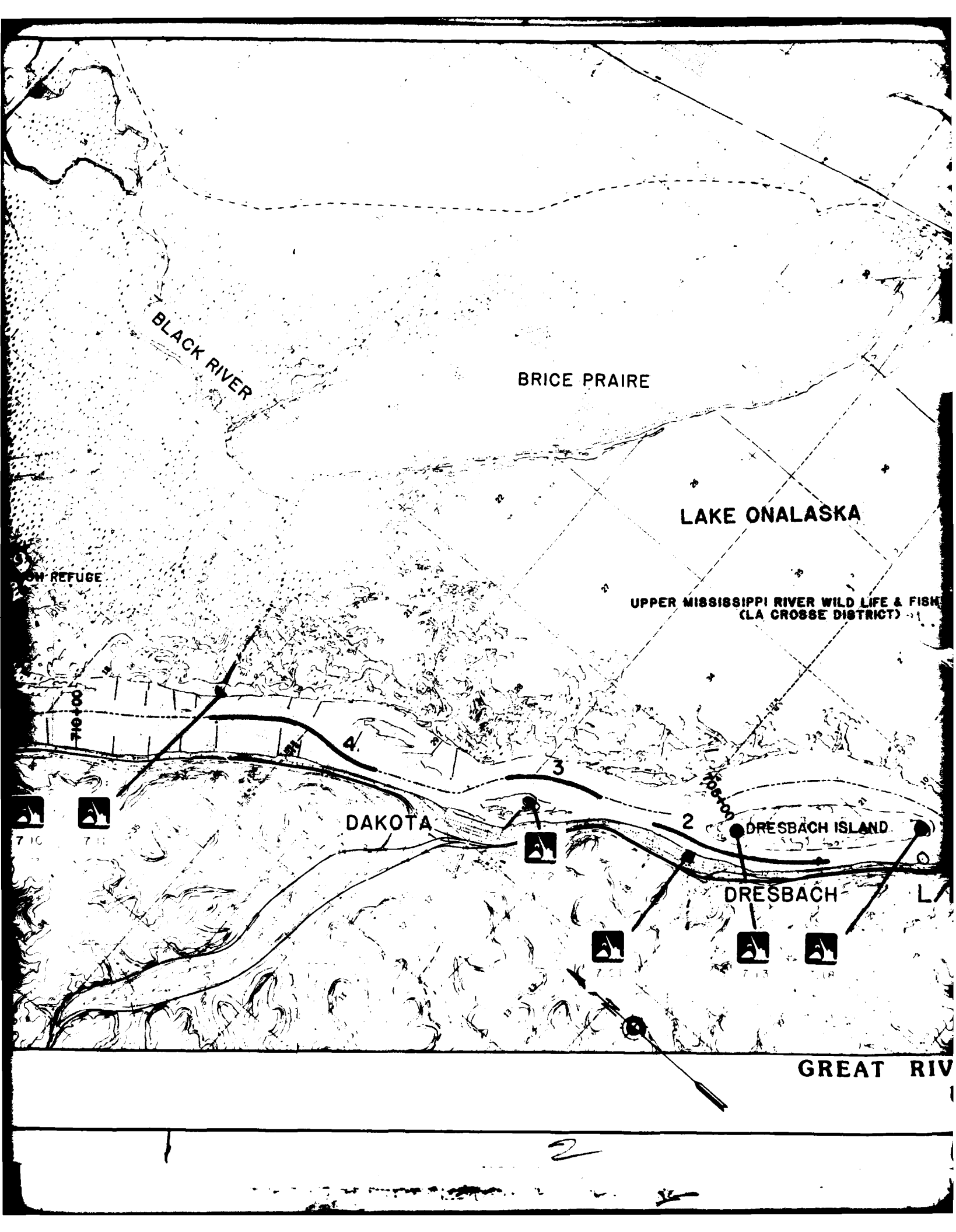
DAKOTA

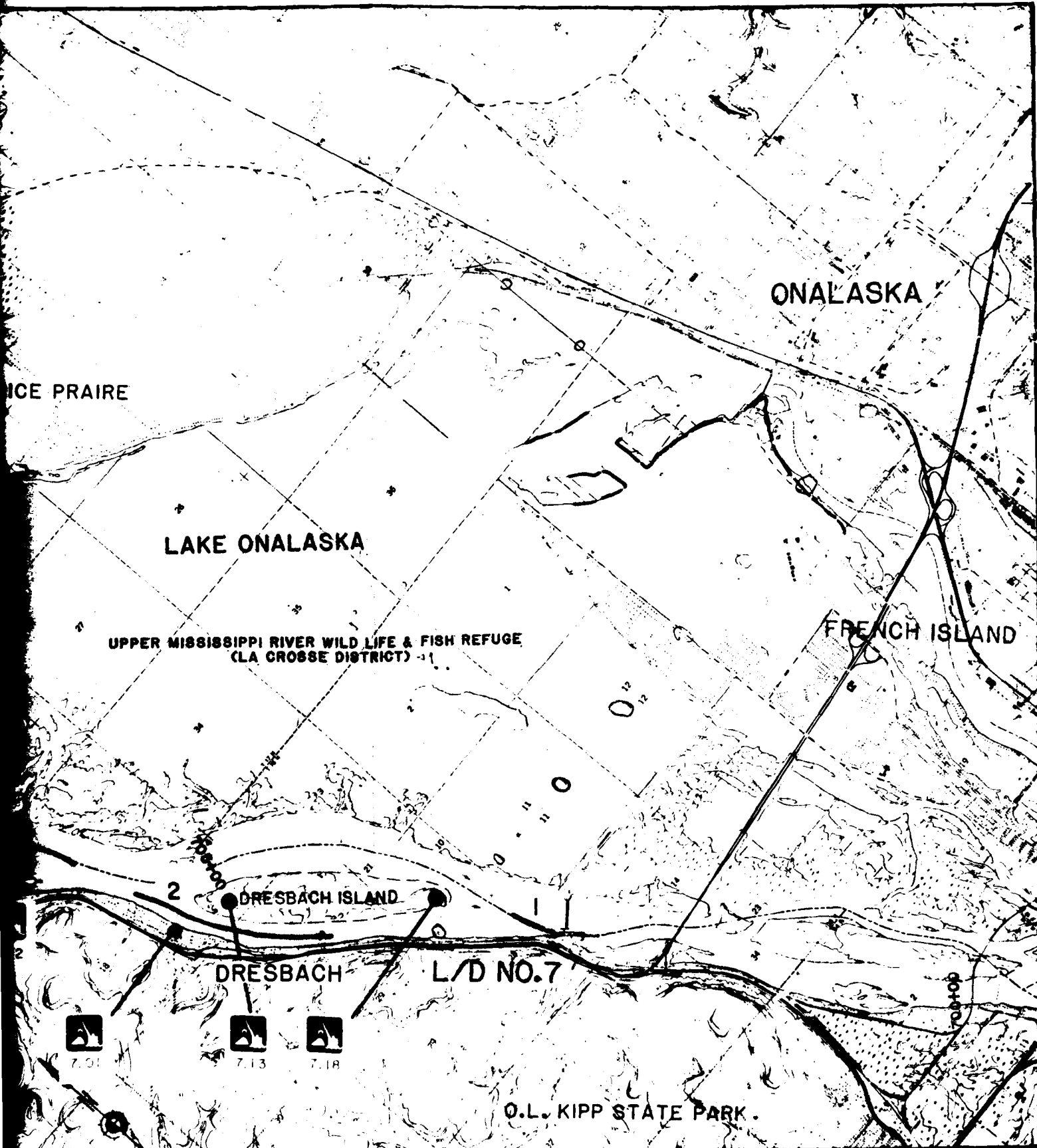
DRESBACH ISLAND

DRESBACH

GREAT RIVER

2





ICE PRAIRE

ONALASKA

LAKE ONALASKA

UPPER MISSISSIPPI RIVER WILD LIFE & FISH REFUGE  
(LA CROSSE DISTRICT)

FRENCH ISLAND

DRESBACH ISLAND

DRESBACH

L/D NO. 7

O.L. KIPP STATE PARK

**GREAT RIVER ENVIRONMENTAL ACTION TEAM**  
**UPPER MISSISSIPPI RIVER**  
(POOL 7-MILE 701 TO MILE 714)

2

1

3

# LEGEND

## RECOMMENDED CHANNEL MAINTENANCE PLAN

5



Alternative placement site



Site number

## ALTERNATIVE MATERIAL PLACEMENT PLANS



Alternative placement site

4.09

Site number

### POOL 8

DREDGE CUT	ALTERNATIVE PLACEMENT PLANS			
	MPFW/OG	NED	EQ	RFFP
1	8.31	8.31	8.06	8.22
2	8.01	8.01	8.06	8.22
3	8.20	8.20	8.06	8.22
4	8.02	8.02	8.30	3.22
5	8.02	8.30	8.06	8.06
6	8.17	8.17	8.06	8.06
7	8.16	8.06	8.06	8.06
8	8.27	8.06	8.06	8.06
9	8.15	8.15/8.06	8.06	8.06
10	8.07	8.28/8.06	8.06	8.06

M = Most probable future without GREAT

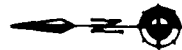
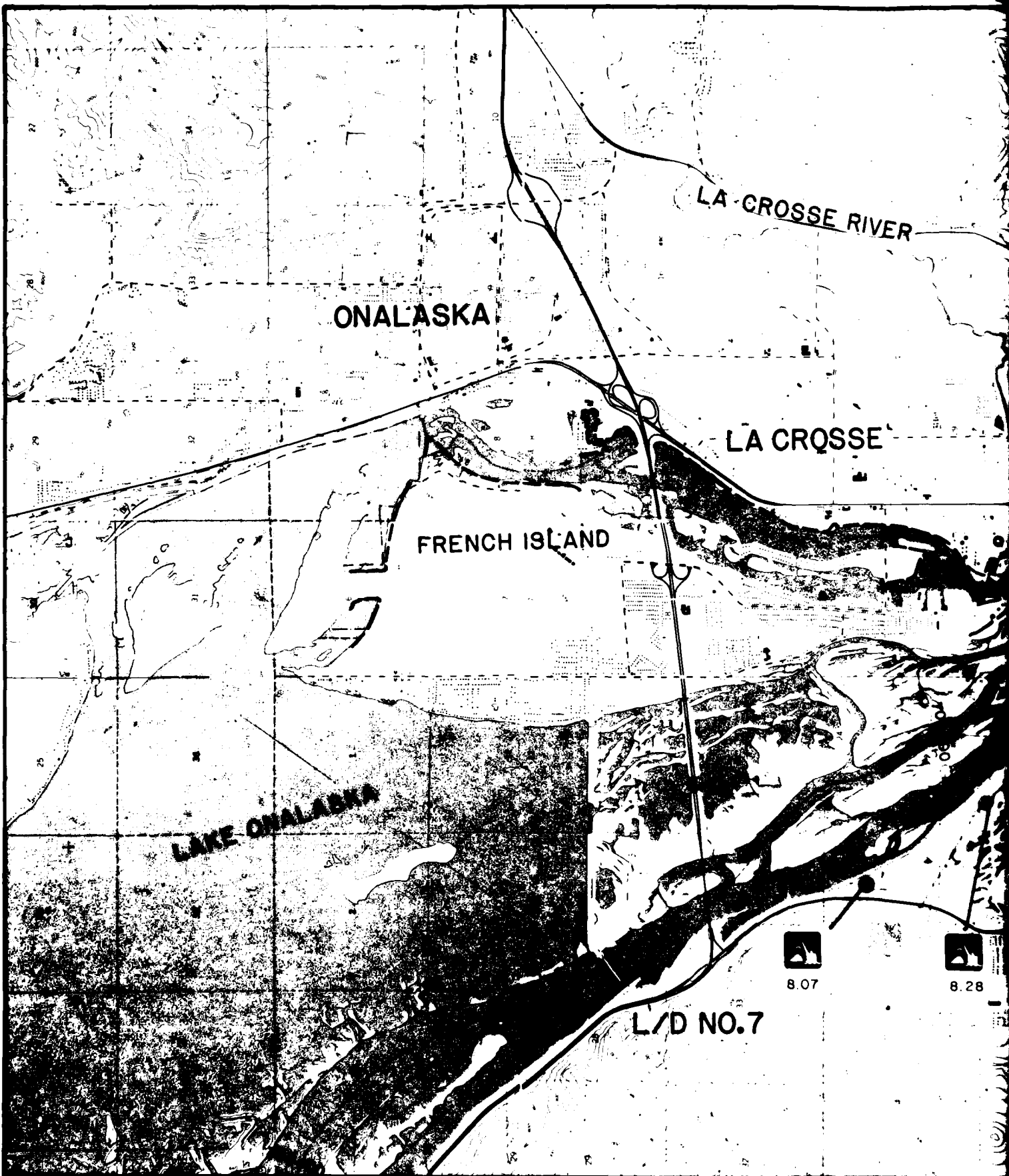
N = National economic development

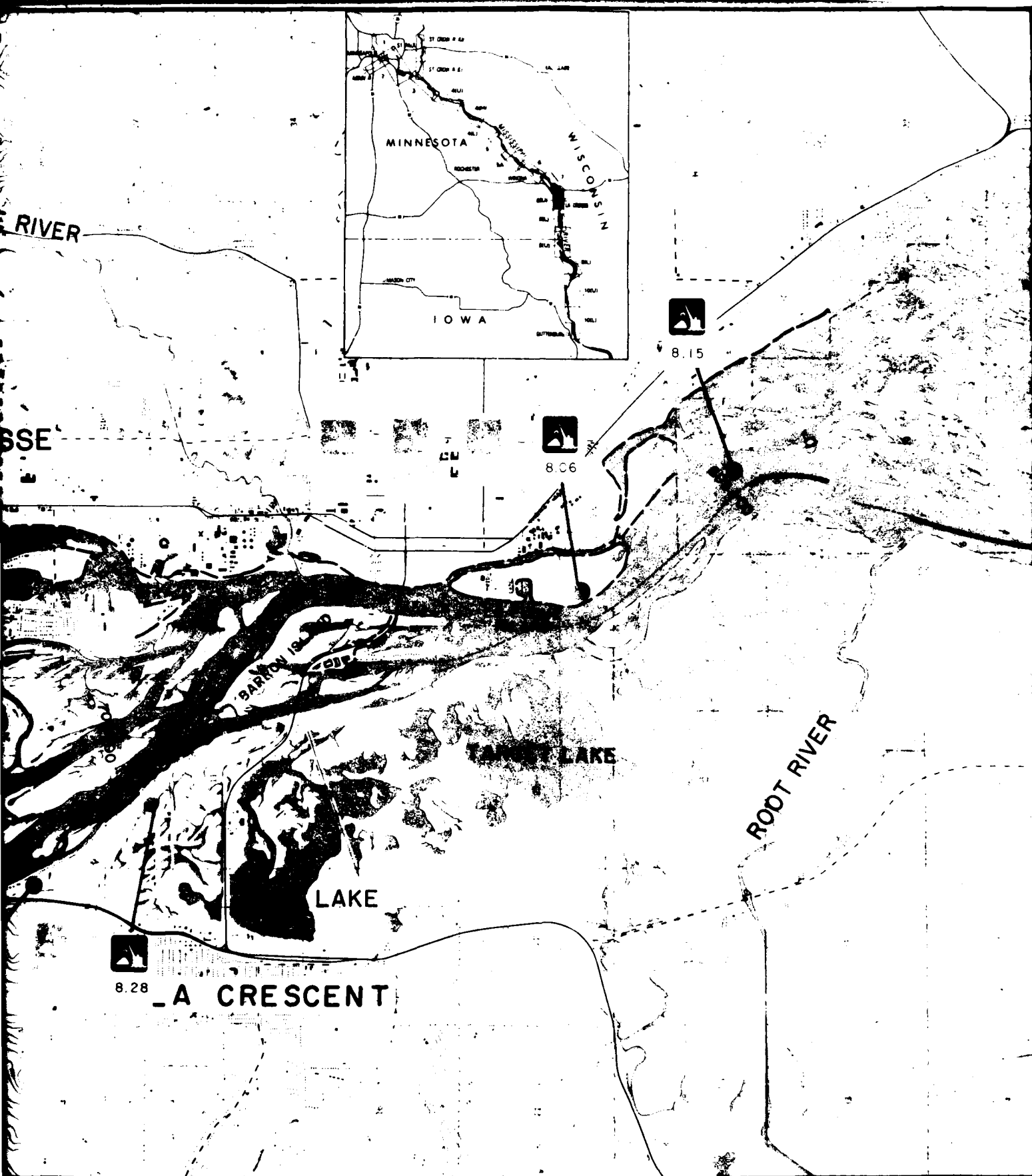
E = Environmental quality

R = Removal from floodplain

SCALE: 1"=4,000'

CONTOUR INTERVAL 20 FEET  
NATIONAL GEODETIC VERTICAL DATUM OF 1929



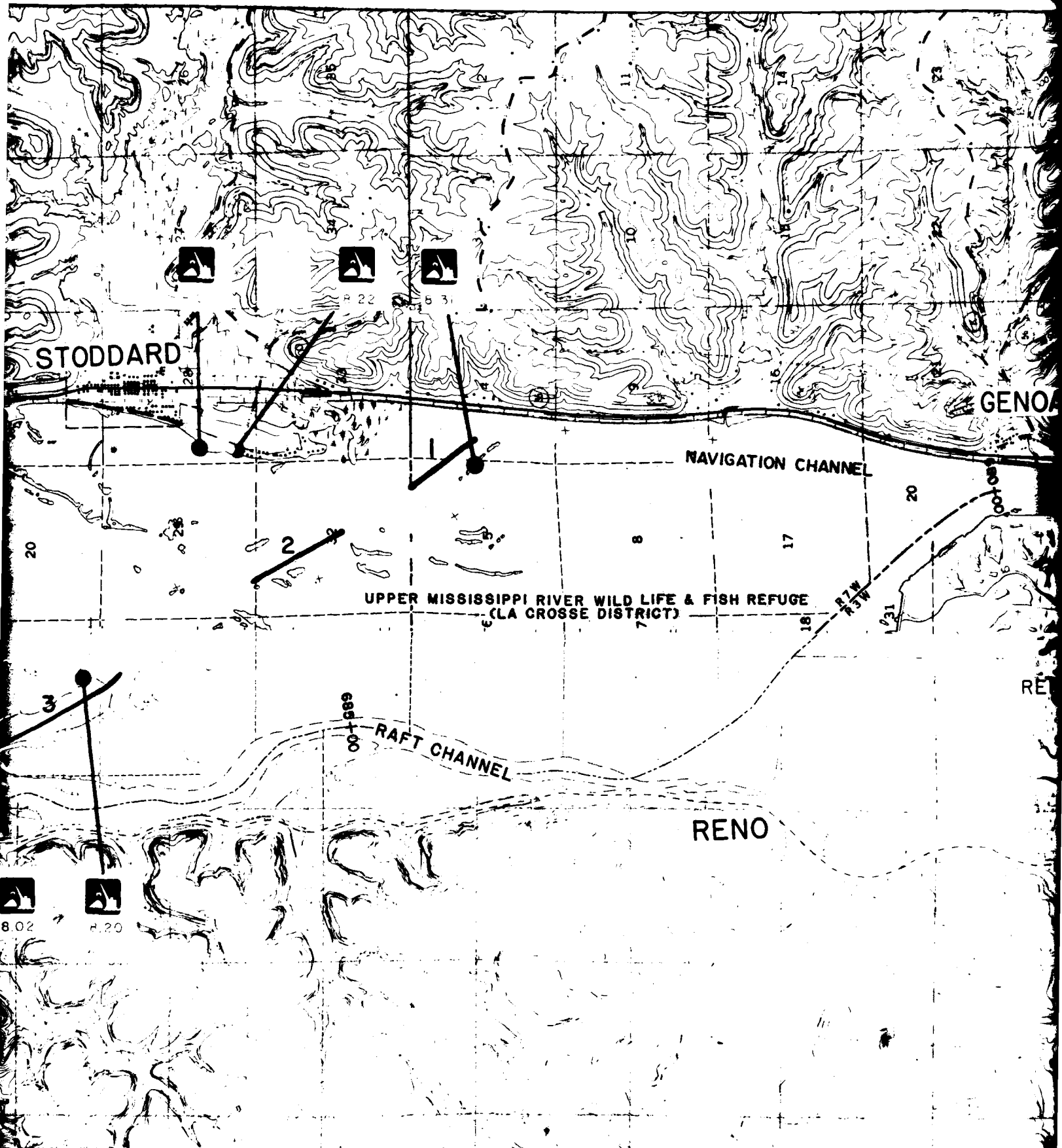


**GREAT RIVER ENVIRONMENTAL ACTION TEAM**  
**UPPER MISSISSIPPI RIVER**  
(POOL 8(U)-MILE 693 TO MILE 704)

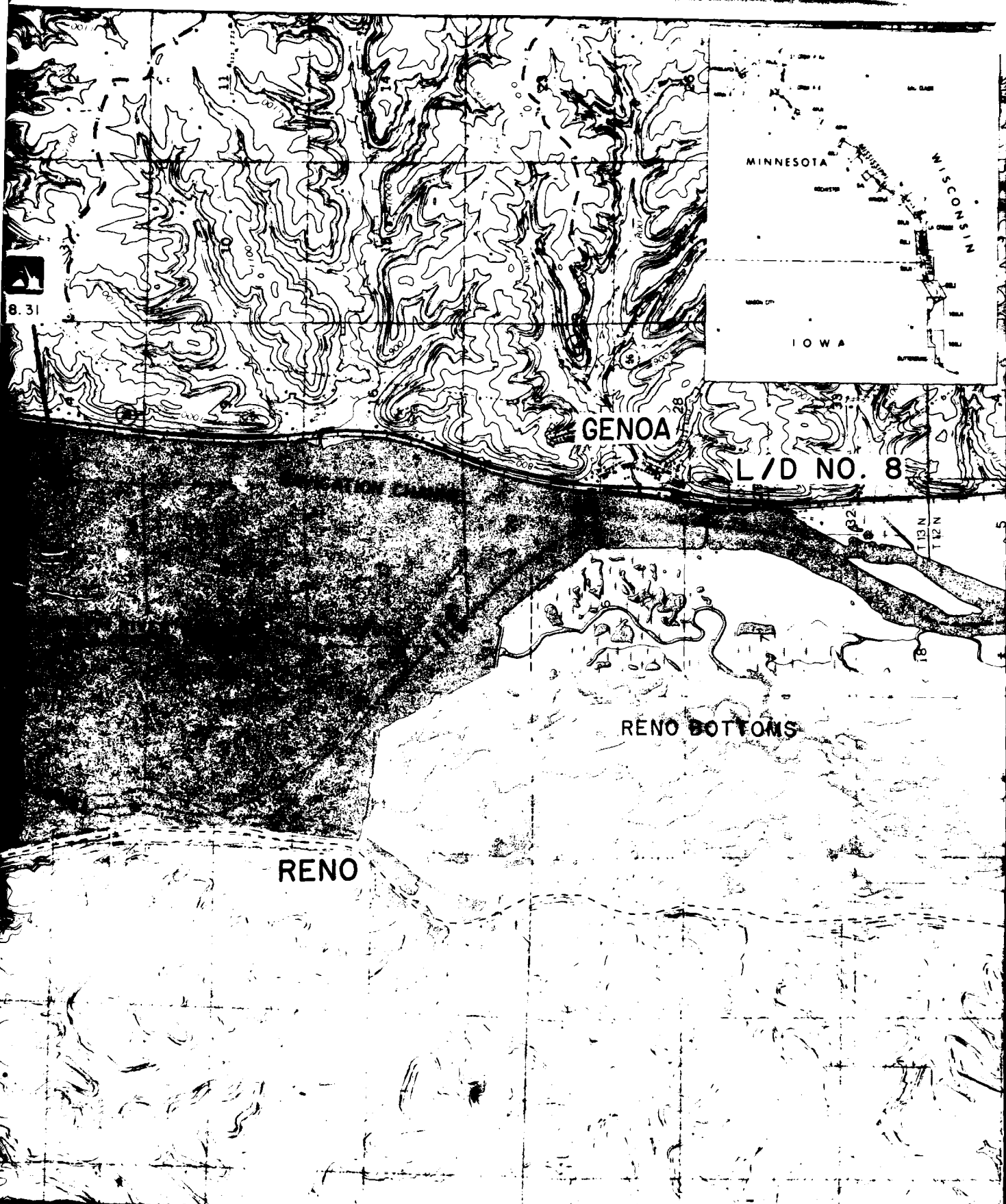


--- FLOODWAY DESIGNATED BY LOCAL ORDINANCE





GREAT RIVER ENVIRONN  
UPPER MISSIS  
(POOL 8(L) MILE 67



**GREAT RIVER ENVIRONMENTAL ACTION TEAM**  
**UPPER MISSISSIPPI RIVER**  
(POOL 8(L) MILE 679 TO MILE 692)

2

3

# LEGEND

## RECOMMENDED CHANNEL MAINTENANCE PLAN

5 - 100% DREDGE CUT



Alternative placement site



Site number

## ALTERNATIVE MATERIAL PLACEMENT PLANS



Alternative placement site

4 09

Site number

### POOL 9

DREDGE CUT	ALTERNATIVE PLACEMENT PLANS			
	MPFW/OG	NED	EQ	RFFP
1	9.34	9.34	9.41	9.41
2	9.35	9.47	9.47/9.42	9.42
3	9.17	9.04	9.03/9.47/8.06	9.41
4	9.18	9.18	9.08/8.06	9.23
5	9.36	9.36	9.08	9.23
6	9.19/9.37	9.33	8.06	9.24
7	9.20	9.20	9.15	9.24
8	9.38	9.38	8.06	9.42
9	9.21	9.21/9.39	9.15/8.06	9.43
10	9.39	9.39	8.06	9.43

M = Most probable future without GREAT

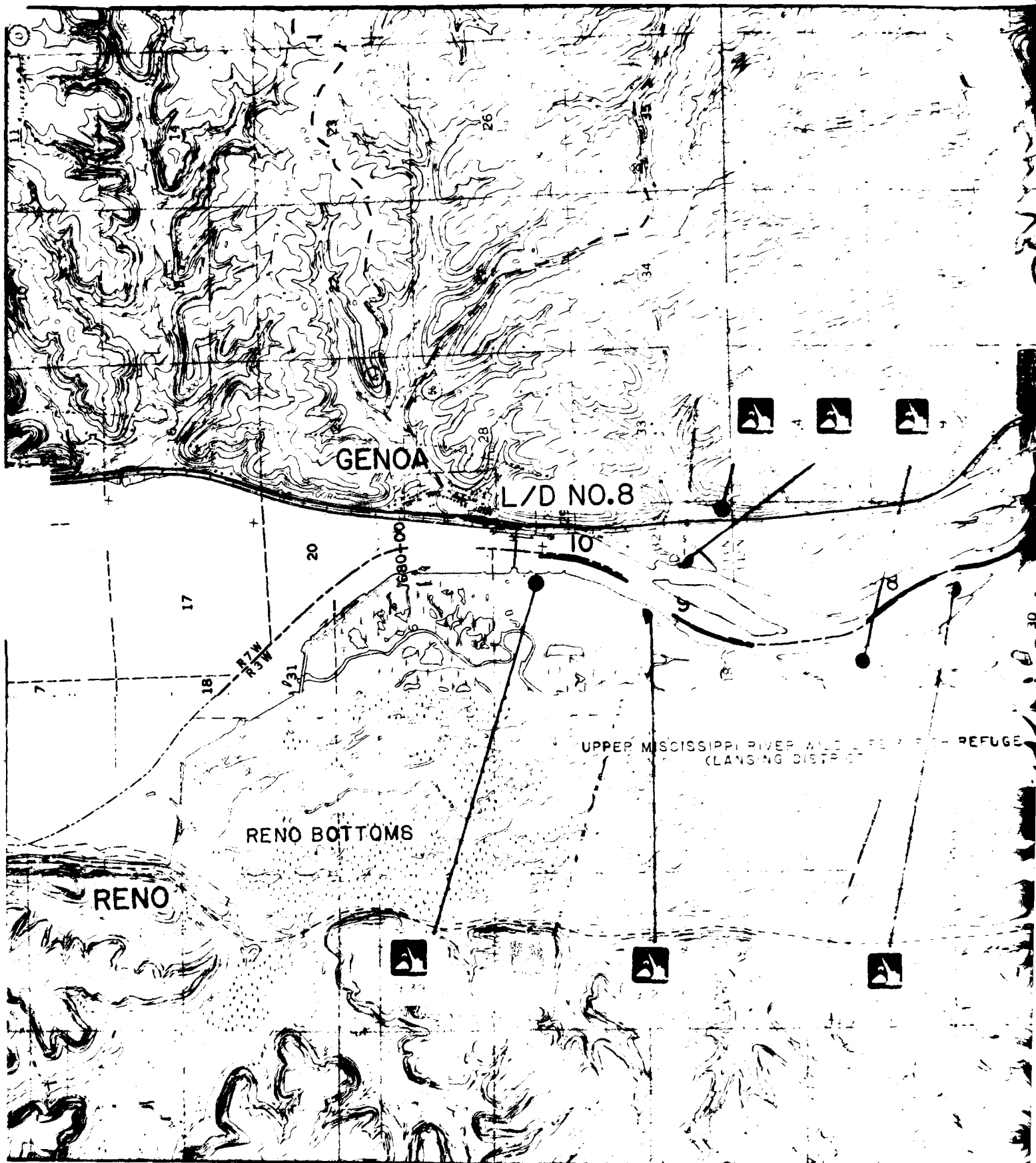
N = National economic development

E = Environmental quality

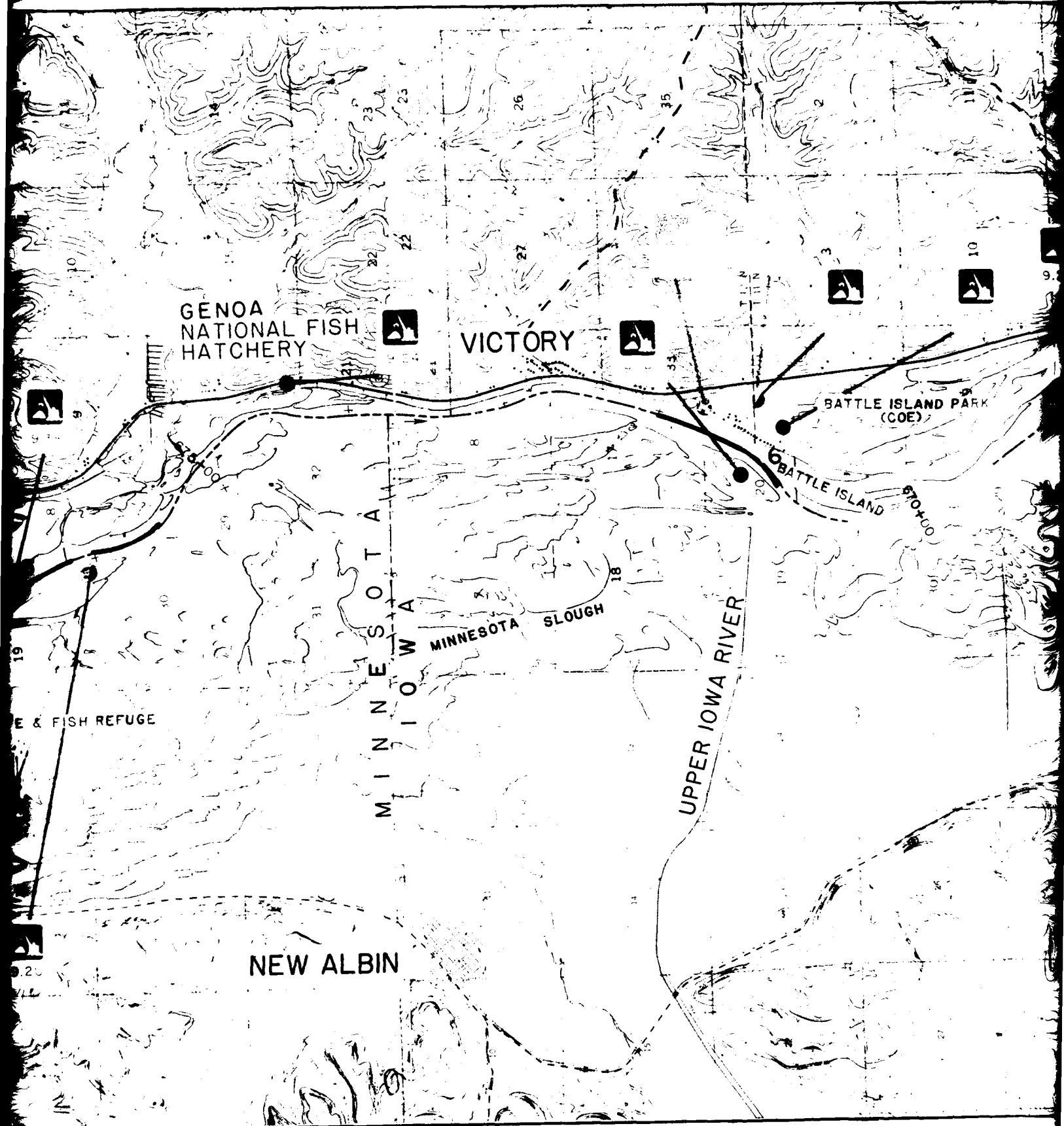
R = Removal from floodplain

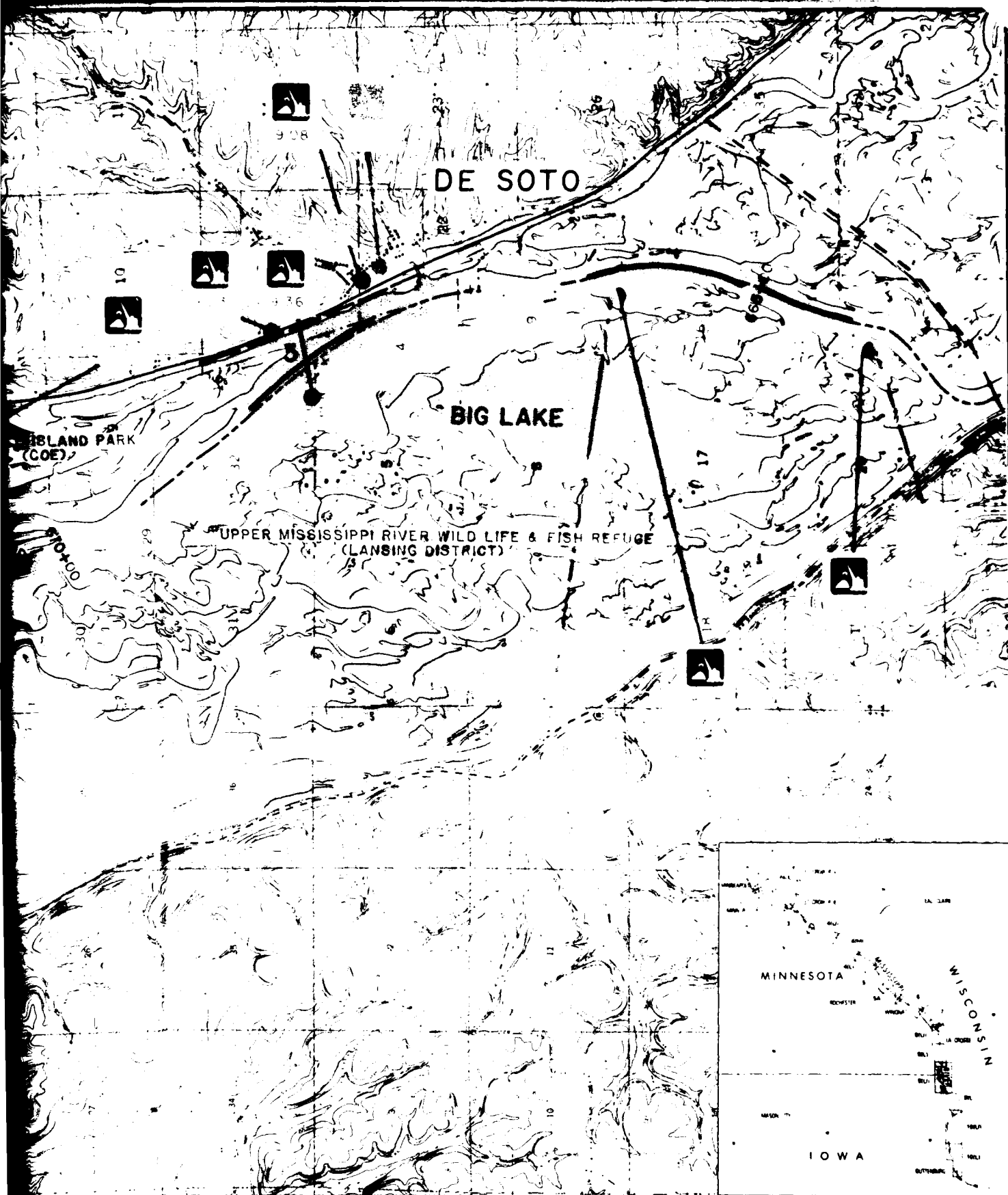
SCALE: 1" = 4,000'

CONTOUR INTERVAL 20 FEET  
NATIONAL GEODETIC VERTICAL DATUM OF 1989

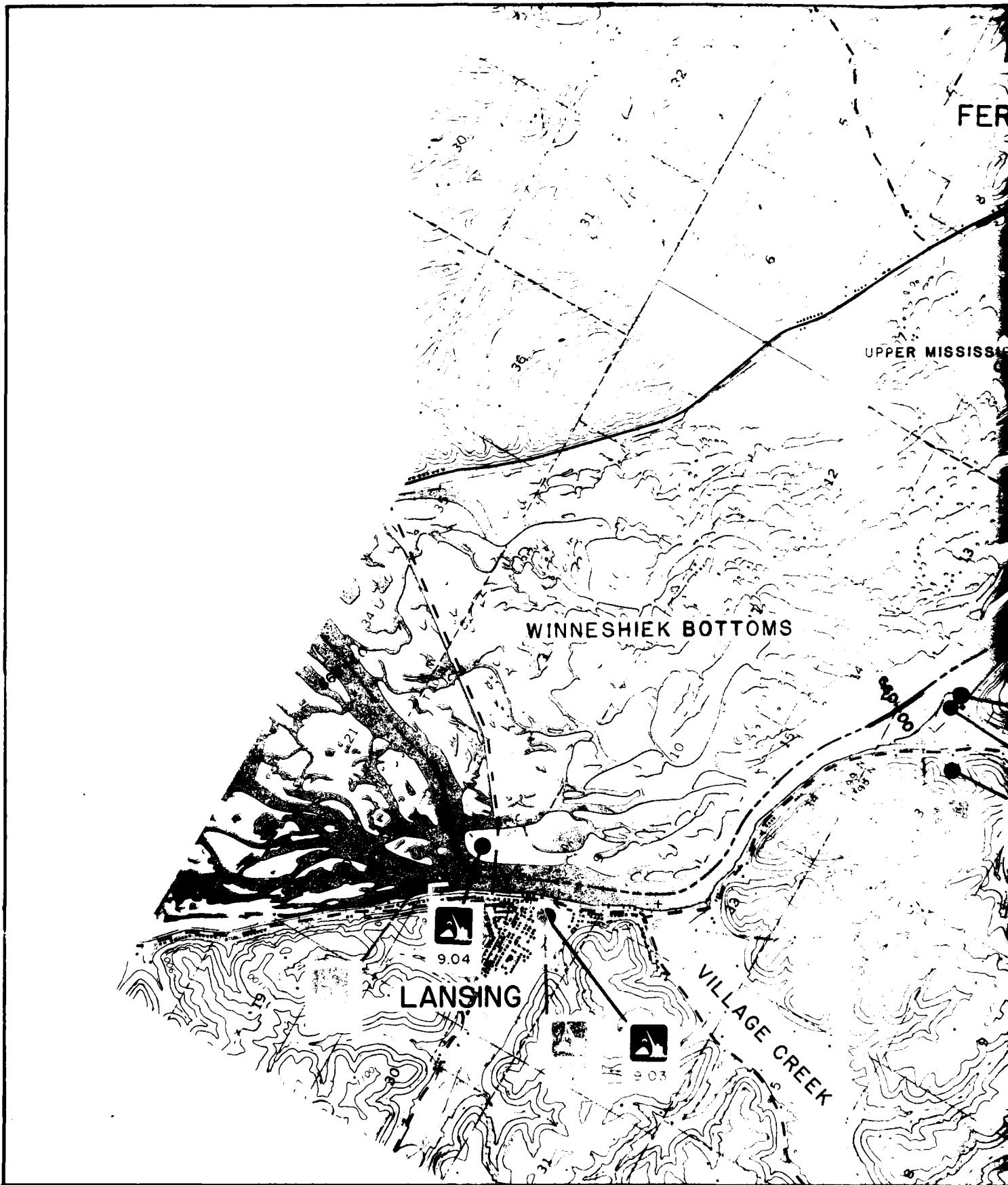


--- FLOODWAY DESIGNATED BY LOCAL ORDANACE





**GREAT RIVER ENVIRONMENTAL ACTION TEAM**  
**UPPER MISSISSIPPI RIVER**  
(POOL 9(U)-MILE 665 TO MILE 681)

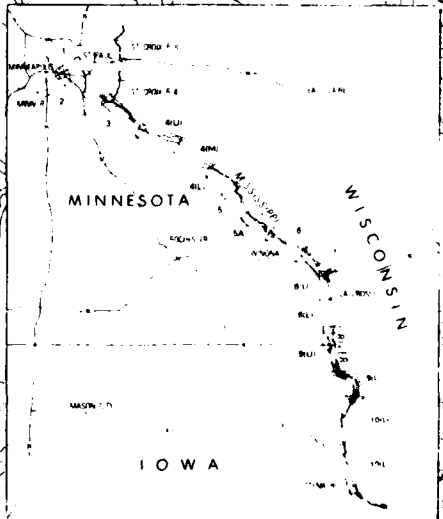


----- FLOODWAY DESIGNATED BY LOCAL ORDINANCE

FERRYVILLE

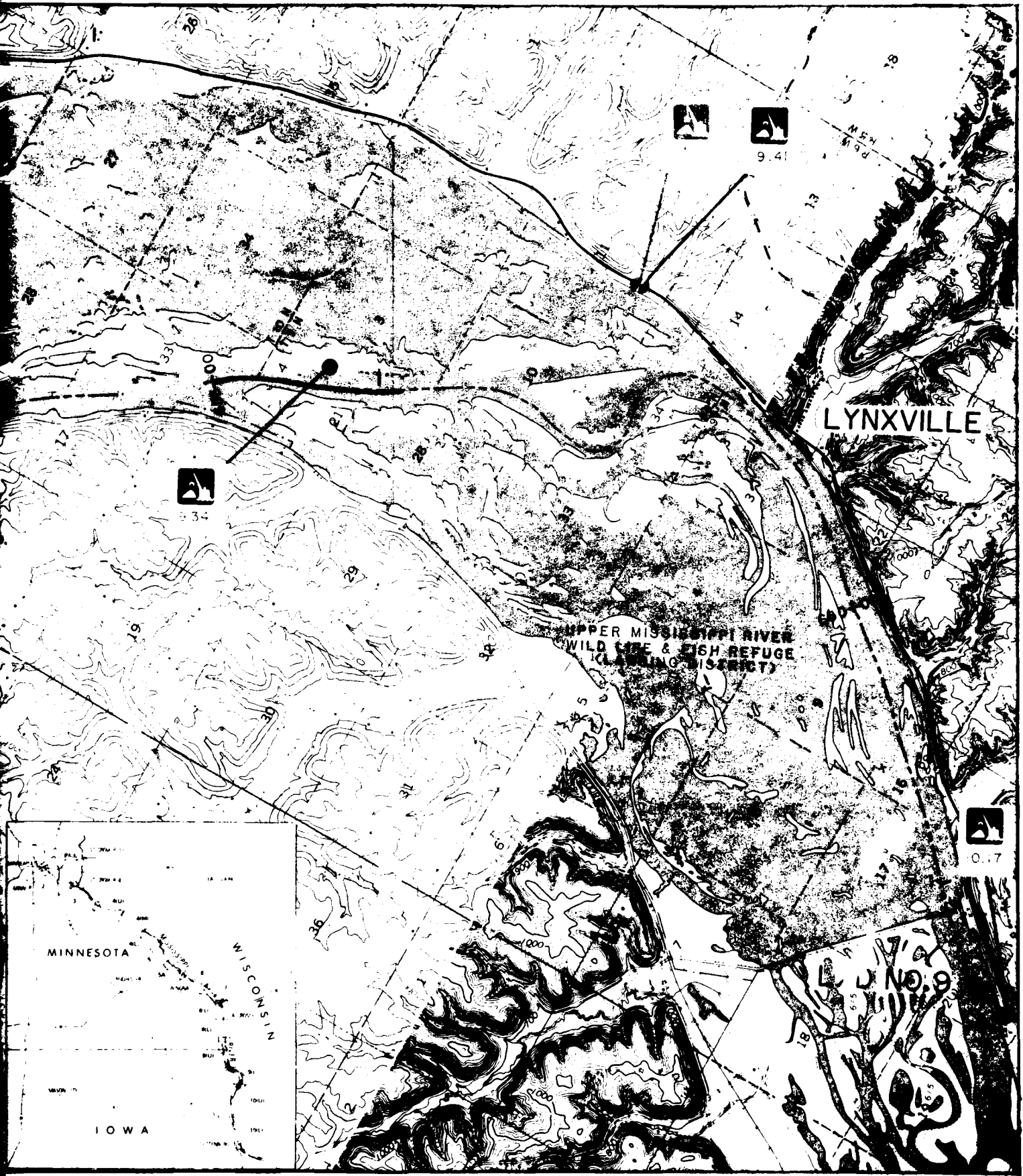
UPPER MISSISSIPPI RIVER WILD LIFE & FISH REFUGE  
(LANSING DISTRICT)

9 35  
9 42  
9 47



GREAT RIVER  
UPP  
(PO





**GREAT RIVER ENVIRONMENTAL ACTION TEAM**  
**UPPER MISSISSIPPI RIVER**  
(POOL 9(L)-MILE 647 TO MILE 664)

# LEGEND

## RECOMMENDED CHANNEL MAINTENANCE PLAN

5



4.09

3.45

## ALTERNATIVE MATERIAL PLACEMENT PLANS



4.09

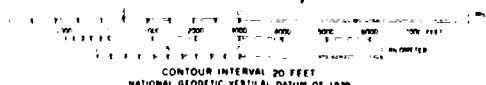
Alternative placement site  
Site number

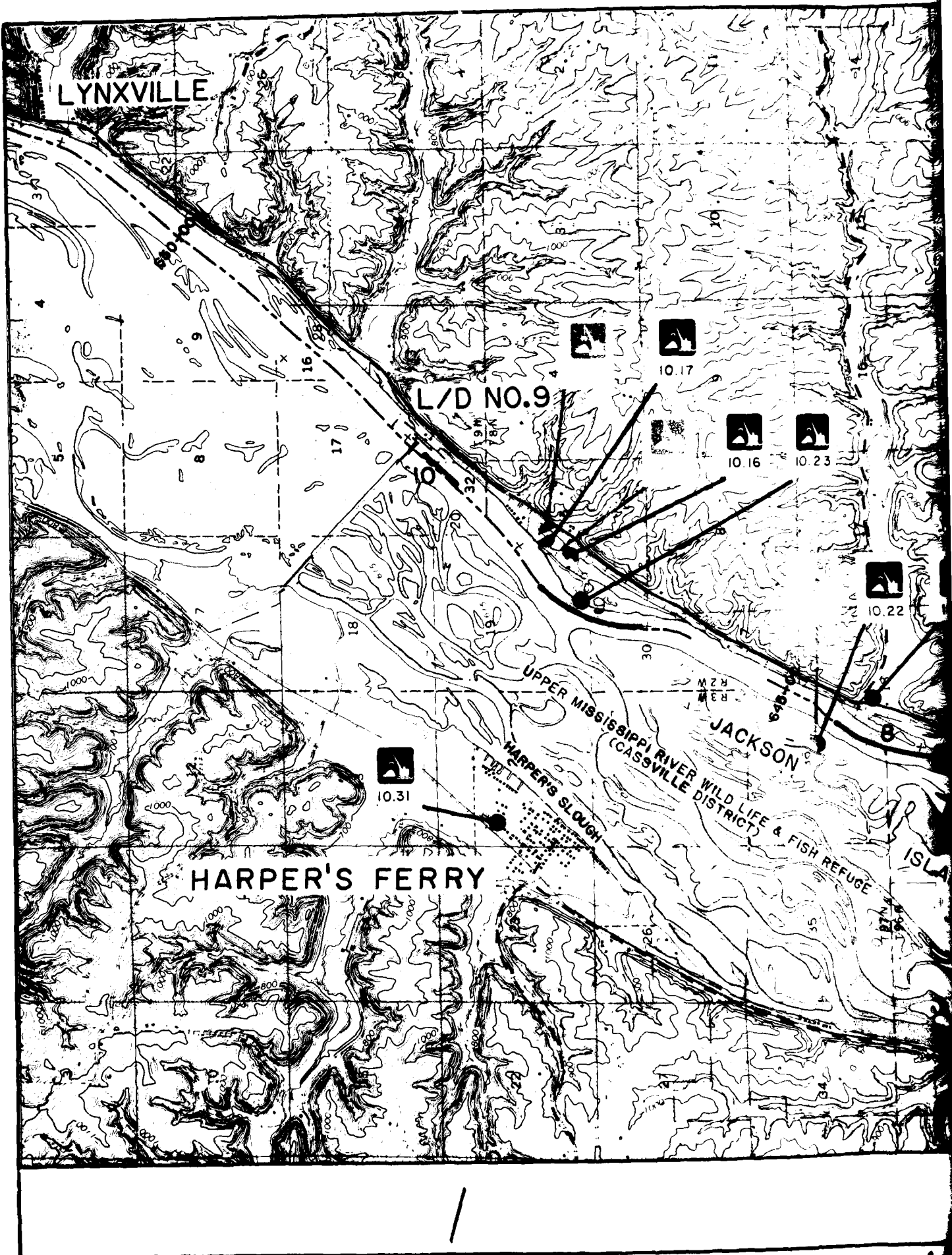
### POOL 10

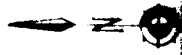
DREDGE CUT	ALTERNATIVE PLACEMENT PLANS			
	MPFW/OG	NED	EQ	RFFP
1	10.33	10.33	10.02	10.01
2	10.18	10.18	10.04	10.01
3	10.19	10.01	10.01	10.01
4	10.20	10.20	10.01	10.01
5	10.32	10.21	10.01	10.01
6	10.01	10.09	10.09	10.09
7	10.30	10.30	10.40	10.31
8	10.22	10.14	10.09	10.31
9	10.23	10.16 / 10.23	10.09	10.31
10	10.17	10.17	10.09	10.31

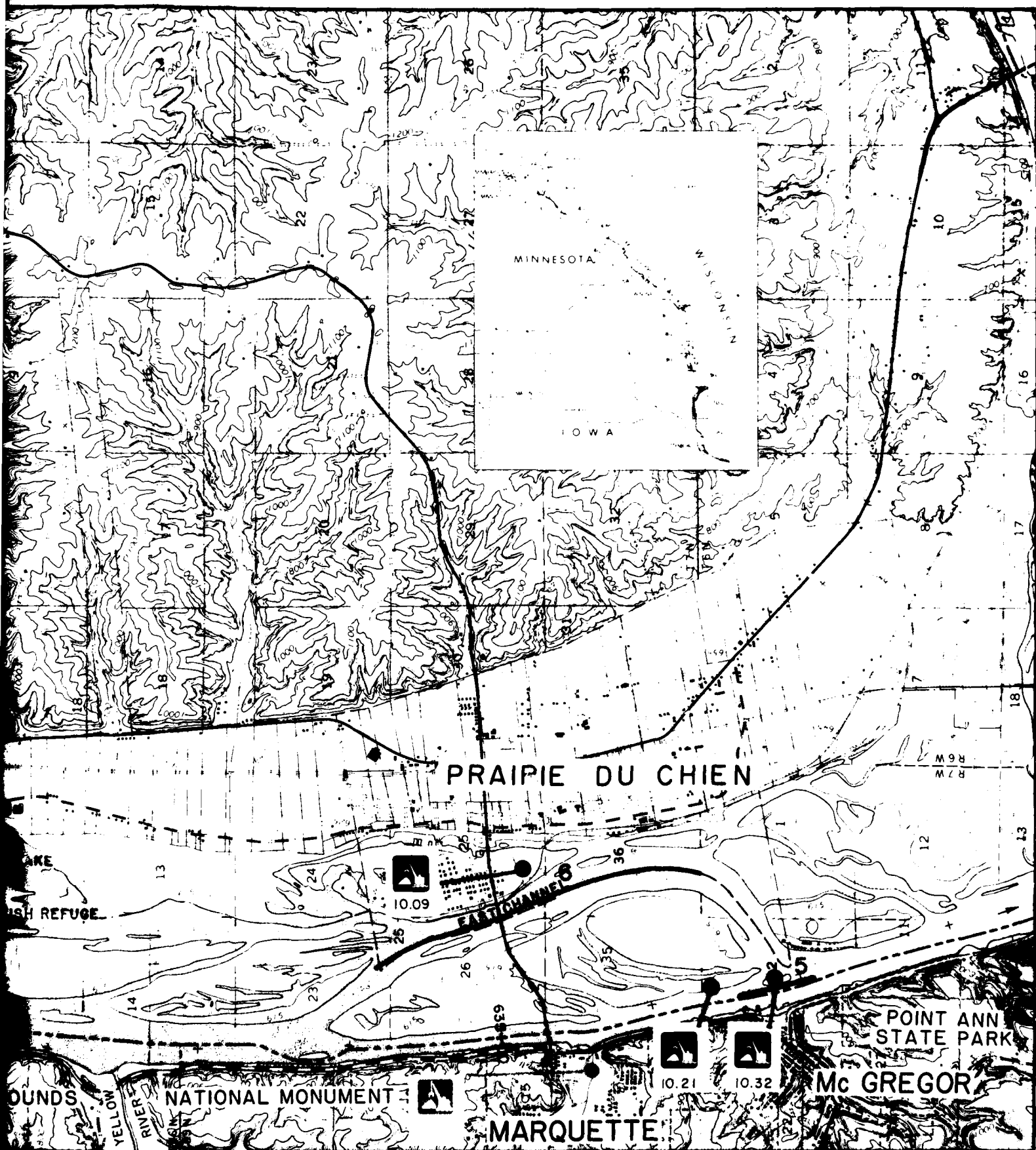
M = Most probable future without GREAT  
N = National economic development  
E = Environmental quality  
R = Removal from floodplain

SCALE: 1" = 4,000'

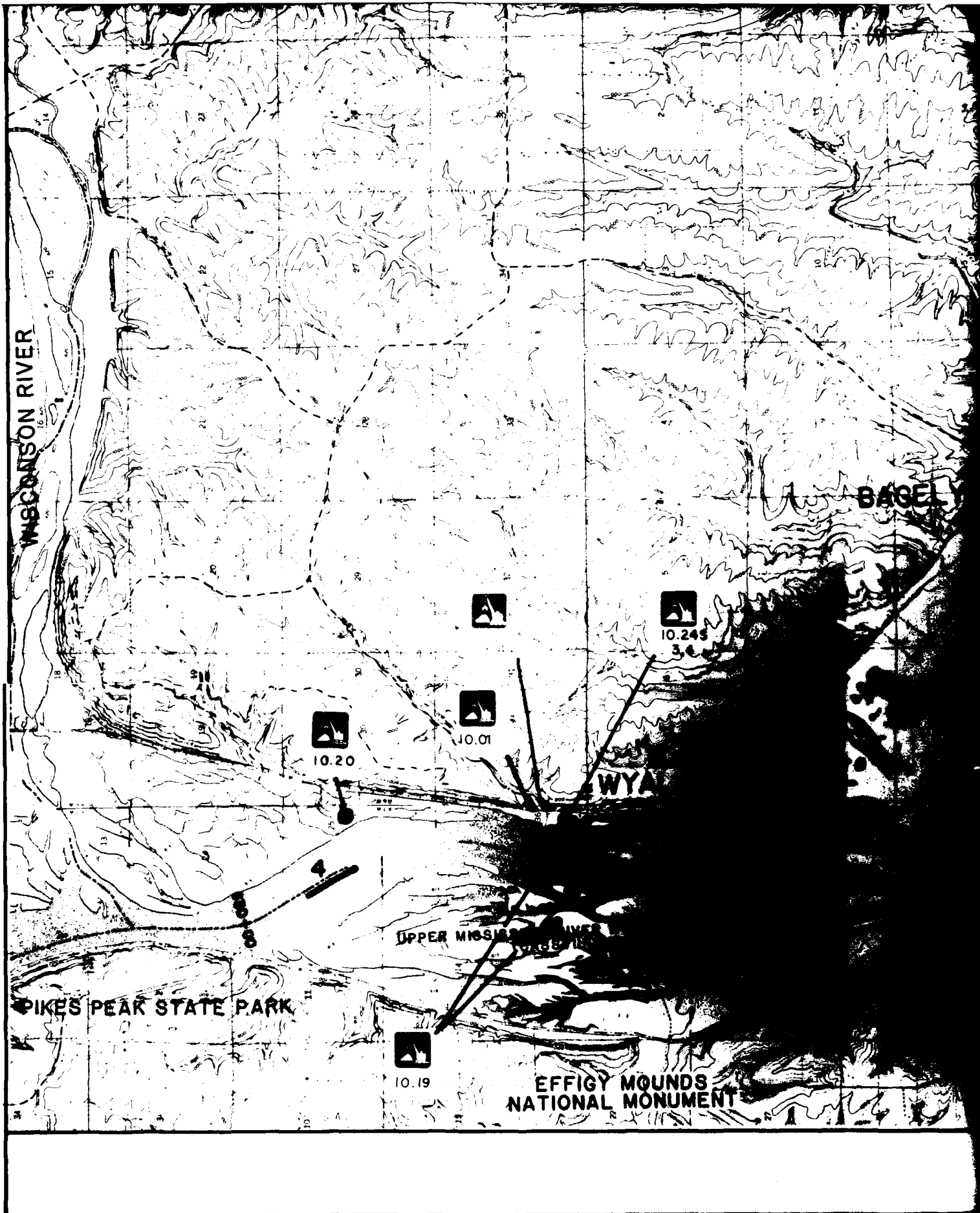


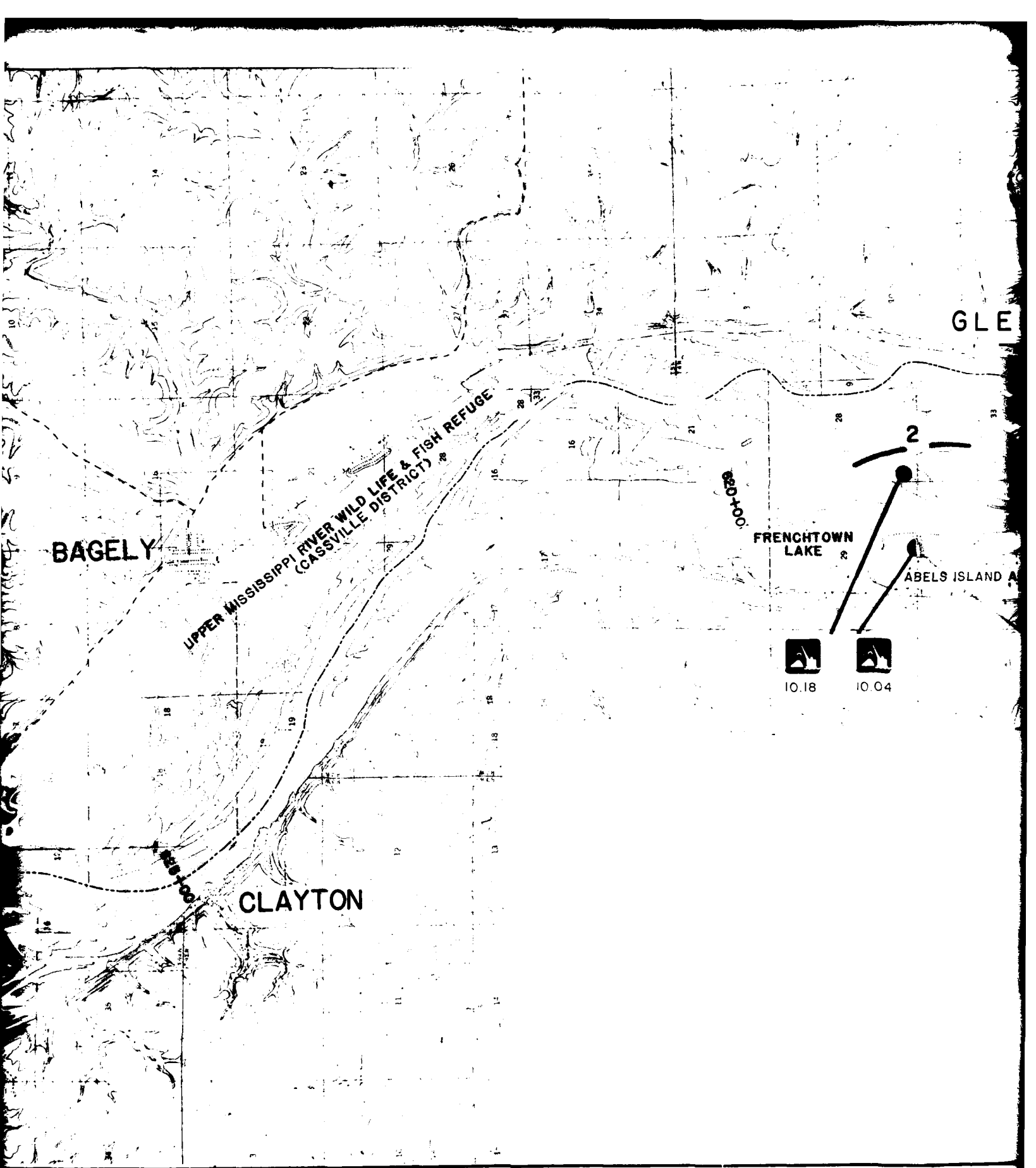






**GREAT RIVER ENVIRONMENTAL ACTION TEAM**  
**UPPER MISSISSIPPI RIVER**  
(POOL 10(U)-MILE 632 TO MILE 651)





GLE

BAGELY

UPPER MISSISSIPPI RIVER WILD LIFE & FISH REFUGE  
(CASSVILLE DISTRICT)

CLAYTON

FRENCHTOWN  
LAKE

ABELS ISLAND



10.18



10.04





GLEN HAVEN

UPPER MISSISSIPPI RIVER WILD LIFE & FISH REFUGE  
(CASSVILLE DISTRICT)

L/D NO. 10

BUSSEY LAKE

GUTTENBERG

ABELS ISLAND AIRPORT



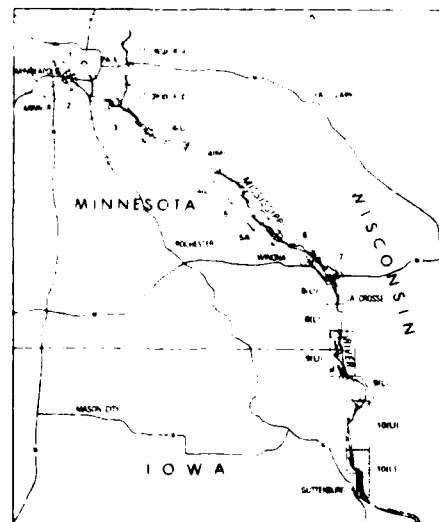
10.04



10.33



10.02



**GREAT RIVER ENVIRONMENTAL ACTION TEAM**  
**UPPER MISSISSIPPI RIVER**  
(POOL 10(L)-MILE 613 TO MILE 631)

3



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